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The Biologists of Tomorrow

CLARENCE J. HYLANDER

*An **apologia** for the viewpoint that mass media—newspapers, magazines, books, radio, and television—are important in influencing young people in the choice of careers, and in the appreciation of the careers of others.*

THE teen-ager of today is the adult of tomorrow. It is hardly necessary to remind a biologist of this inevitable process of growth. But growth means development, and development depends upon factors outside the individual as well as upon inherent capacities for growth. We recognize this fact in the laboratory, but do we see its application to everyday life? The kind of adults our teen-age group choose to make of themselves, the pursuits they will select as careers, the opinions they will have of their fellow workers and the role they will play in building a better, or a worse, world of tomorrow, depend upon the educational influences brought to bear on them today.

The role of formal education in conditioning students is undisputed. The need for selecting the right kind of teachers has been emphasized repeatedly. As biologists we are well aware of the importance of the caliber of biology teachers, especially at the secondary level, and of the educational environment in which they teach. The fact that biological sciences should be presented in such a way as to encourage capable young people to select our profession as a life work has been the subject of many recent studies, symposia, and articles. Formal education as a means of determining and selecting the biologists of tomorrow needs no reiteration here.

Shall we rely upon formal education as the only means of keeping the layman informed of the progress and worth of the biological sciences, and of inspiring recruits to widen our biological horizons? Or are there other educational forces which should be brought into play to assist the greatly overworked teachers? It is possible that various indirect and informal educational influences have as much impact on a young adult as the formalized presentation in schools and colleges. In the home, the attitude of the parents towards careers, and their ability to help their children select careers wisely is still a vital part of the educational process. This responsibility cannot be entirely delegated to those paid to instruct our youngsters. In the community, such activities as Boy and Girl Scouts, YMCA's and YWCA's, Parent-Teacher Associations, libraries, and service clubs play an important role. A widening of the circle of influences which affect the growing teen-ager brings us to the mass media: the printed words as disseminated in newspapers, magazines, and books; the spoken words, in person and by radio; and the imagery of television. From these sources, what kinds of ideas are the young people getting about the biological sciences, their role in building a better world for tomorrow, and the opportunities for satisfying careers? And equally important, what part are we as biologists individually playing in this neglected aspect of public education?

The Biologist and the Community

It has become too easy for the individual today to shift responsibility from himself to that of a panel, committee or foundation. We say that life is too complex, problems too involved for one person to attempt to solve. Too often we feel that we are a voice crying in the wilderness, and can accomplish little in bringing about a desired change; thus we set up a study group to survey the situation, collect endless pages of statistics, make recommendations. In long-range planning involving a number of specialized activities, this is undoubtedly necessary. But in some cases a more direct approach seems not only possible but more certain of immediate results.

What is the popular idea of a biologist in your town, compared with a doctor, a chemist, an electronics expert, or a sanitary engineer? A recent survey of high school students revealed that few want to become biological scientists because they think of them as "squares". Do your young friends, or the companions of your children, think of a biologist as a man with a butterfly net or a spinster devoted to a herbarium rather than a beau? Every biologist, as an informed citizen in one phase of human endeavor, by participating in the activities of a community can arouse a respect for his profession and even an interest in following his footsteps. We are all deeply convinced of the worth of our biological efforts; do we express that conviction whenever possible? Turn to the impressive list of biological societies on the inside front cover of the *AIBS Bulletin*. Few are the communities which do not have a personal stake in what a phytopathologist, a horticulturist, a forester, a geneticist, or a physiologist is doing. If you are one of these, or any other biological specialist, why not take time to address parents or teen-agers whenever the opportunity presents itself?

At this point I must ask for leniency, in using instances of personal experiences as examples. Generalities can be readily stated, even if based on hearsay evidence. But specific and pertinent facts are best selected from one's own first-hand knowledge. On numerous occasions, in various communities where I have lived, I have been asked to speak at Parent-Teacher Association meetings on, say, the natural history of some national park. I know what is expected is a painless hour of looking at kodachromes. It is a temptation to refuse on the basis of being too busy. But when I accept, it does provide an unusual opportunity to talk to *parents* on appreciation of our natural resources and the importance of the work of field biologists. Invariably at least one parent will approach me with the tale of how his Johnny might like to be a forester, and wants to know how he should go about it. On other occasions a delegation from a high school class with a science project in economic entomology, or from a Scout group which wishes to learn to identfy trees in winter, has asked me to give a short informal talk. No matter how young or how old the audience, it has been an occasion to "sell" biology at the grass-roots level. Let none of us be too "high hat" to talk about our work, in terms the layman will understand, to groups no matter how small or seemingly unimportant. If every biologist who receives the *AIBS Bulletin* (there are 15,000) were to accept even once next year an opportunity to talk about biology to a group of teen-agers, a little arithematic reveals that, averaging an attendance of 25 per group, some three hundred and seventy-five thousand would have had a few moments of first-hand knowledge about our profession!

The Biologist and the Printed Word

When I pick up a newspaper, too seldom do I find a story that some courageous biologist has made available to the press. Yet many a tale to fascinate the public lies hidden in the mysteries of biological research. It may be the physiological significance of some startling studies on a marine invertebrate, from the Marine Biological Laboratory at Woods Hole. It may be a progress report on some cancer research at the Roscoe B. Jackson Memorial Laboratory at Bar Harbor. It may be the play-by-play account of a winning battle against an insect pest which had threatened the staple crop of a community, and the part played by a Department of Agriculture biologist in the struggle of man against insect. Or it may be a thrilling account of awakened community interest which saved from extinction a rare species of orchid or a group of redwoods. Such items, re-

leased as news, are too few and appear too seldom. By contrast our fellow sciences of chemistry and physics find space regularly in the local and national press. What is the reason for this state of affairs?

It is obvious the reason for this relative lack of news coverage cannot be the content of biology. Biology is far more understandable to the layman than the details of molecular action or the mysteries of electronics. It is much closer to our everyday experiences with living animals as pets or on the farm, with garden and crop plants. Unfortunately it seems that the fault lies with the biologists themselves. They are by tradition modest and shy individuals as compared to other more aggressive professional groups. Modesty is commendable but, like thrift, can be carried too far. "Better Things for Better Living" may attribute to an allied science what rightfully belongs to biology, but the attitude of many biologists is to laugh it off and do nothing. At each national meeting of biological societies, AIBS operates a public relations office for liaison with the press, and urges biologists contributing papers to provide short, readable summaries of their presentations suitable for release. Newsmen hunger after interesting scientific news, and gladly accept any assistance they can get from the scientists themselves. A number of universities have excellent public relations departments which perform an important function in maintaining liaison with the press, assisting the faculty in preparing releases and taking care of their distribution. Biologists cooperating with such activities are contributing an important element in furthering the appreciation of biology and the opportunity for future work in their fields.

For the more creative writers, there is the possibility of preparing articles for popular magazines. Too often the biologist, like other scientists, feels that his responsibility in writing ends when he completes an article for his professional journal. It is obviously the scientist's obligation as a researcher and a teacher to do this. But only rarely does an article in a society journal come to the attention of the general public. Only rarely can such an article be read by this group with ease and understanding. We cannot all reach the pages of *Collier's*, *Saturday Evening Post*, or *Reader's Digest*—but it is a challenge to try. Before Rachel Carson, what oceanographer or ichthyologist would have dreamed of reaching the public through the pages of the *New Yorker*? Recently *Life* magazine carried a most popular series of articles which dealt with the living world. The December issue of *Horticulture*—an excellent magazine for gardeners—has just come to my desk. An article entitled "If I Had a Million Dollars," written by H. B. Tukey of Michigan State University, stares out at me from page 551. After reading it, I felt that many laymen would have a new appreciation of the role of biologists in the development of ornamental plants.

Why have so few of us made such contributions? Is it because (Heaven forbid!) it takes more skill and effort to write a readable popular article than a technical one for our journals? Is it because the biologist will lose caste among his colleagues? Is it because we are too interested in the progress of our own segment of research to take the time to interpret it more broadly in terms of public understanding? There are literally thousands of subjects calling for authors. The few who are trying to answer that call should be appreciated for what they are doing in influencing the development of the biologist of tomorrow.

I wish I had the space to elaborate upon the subject of biological books for the teen-age group. This area has been of special interest to me for the past twenty years. Here is a wide-open door for biologists who can express themselves on adult subjects in simple and direct terms suited to the teen-ager. It is one of the few fields of writing in which publishers are actually looking for authors. The financial rewards are often not such as to embarrass one with the Director of Internal Revenue. But there is a satisfaction in reaching five or ten thousand young readers through the permanence of a book which may be treasured for years. Biographies of biologists who have done interesting work, stories of discovery and achievement in special areas of biological research, or tales of specific professions in the biological sciences are conspicuous by their absence. The publishers' lists of books for young adults reveal a very small percentage of biological subjects, even if the range is broadened to include natural history and exploration. The same reasons may account for this lack, as for the dearth of magazine articles. We might add that completing the three hundred pages of manuscript for such a book is no slight task. Yet its conception and completion will provide a stimulus to parents and teenagers alike to think of biology as a possible career in the world of tomorrow.

The Biologist and TV

Scientific exposition at the popular level relies heavily on visual aids. On TV, therefore, the scientist has a unique advantage. A scientist in the field or in the laboratory is a dramatic person, a combination of detective and guide into the mysteries of life. For the past three years I have hopefully watched educational programs on TV expecting at any time to see the visual potentialities of the biological sciences brought into several million homes. I will never forget the audience reaction of my students when I first secured a micro-projector which could fill a screen with the drama of life in a drop of water. The daily round of birth and death, of eat or be eaten, in the realm of algae and protozoa could make a "spectacular" which would compete with many ninety-minute musical extravaganzas.* The diverse fields of AIBS societies alone could easily provide interesting material for weekly presentation on a national network. (*Editor's note: This was done recently on "Today".)

Biologists have an edge on the physicist and chemist in the attraction of their subject matter to young people. The Johns Hopkins Science Review pioneered in presenting laboratory scientists at work. Disney has demonstrated the appeal of the outdoor biological sciences in his collaborative studies of beaver, elk, buffalo, and desert animal life. The American Museum of Natural History in New York, and the Chicago Zoo have presented commendable life-science programs which have had an unexpectedly popular reception. The way has been shown, and other biological groups should carry on. It is possible that such TV programs have influenced many young people in the choice of biology as a career. Why not an effort on our part as individuals to utilize this new medium as a means of informing the public of our work?

And in Closing . . .

The world of tomorrow will need a biological outlook even more than the world of today, if we can judge by the present rate of man-made inventions and man-created sources of energy. The future of mankind never seemed more hopeful, provided we can keep in balance the constructive, biological forces, with the destructive applications of other sciences which seem aimed at annihilating our natural environment, if not man himself. When informed of a large sum allocated for government research on a space-satellite program, and of the exciting possibilities that there *may* be life on *other* planets, one scientist remarked, somewhat wistfully, that there *could* be life on *this* planet, if we wanted it enough.

The viewpoint of the biologist is important in the total picture of man's future. The work of the biologist is vital in understanding the living world of which we are a unique part. We all agree that this is true. But shall we leave to chance the heritage we are building? Other professions are realizing the importance of recruitment of suitable young people to take their place in the ranks of tomorrow. High school and college students are fast becoming a "market" for which the various professions are bidding with (why mince words?) propaganda. What are we biologists doing about this? Are we selling ourselves and our profession short, and losing by default? Or shall we accept the challenge of the times and use today's diverse media to help guarantee a supply of capable biologists for tomorrow?

The Southeastern and North Central Conferences on Biological Teaching

RICHARD R. ARMACOST, *Purdue University*
and
RICHARD L. WEAVER, *University of Michigan*

THE North Central Conference on Biology Teaching was held August 19-30, 1955, at the University of Michigan Biological Station, Cheboygan, Michigan. A similar, regional Southeastern Conference on Biology Teaching was held last year at the University of Florida, Gainesville, Florida. Both meetings were sponsored by the National Association of Biology Teachers with $15,000.00 grants received from the National Science Foundation.

The major objectives of the conferences can be stated as follows:

1. To study the contributions of certain subject-matter areas of biology to the training of biology teachers, and to suggest experiences and methods by which this content can be transmitted to students.
2. To present recent scientific developments of significance in the selected areas.
3. To select and discuss some of the major problems found in:
   a. the teaching of high school biology;
   b. the teaching of college biology;
   c. establishing a state-wide program or emphasis on biology teaching.
4. To develop suggestions and recommendations for:
   a. the improvement of high school biology teaching;
   b. the improvement of college biology teaching, particularly in teacher training programs;
   c. providing a greater emphasis on biology teaching at the state level.
5. To devise methods for implementing the recommendations of the conference.

At the Southeastern Conference, the relationship of biology to those who teach it was considered from the standpoint of the classical subdivisions of: Morphology, Taxonomy, Physiology, Ecology and Conservation, Evolution and Paleontology, and Genetics. Science consultants were Herbert P. Riley, Head, Department of Botany, University of Kentucky—Genetics; Loren C. Petry, Professor of Botany, Cornell University—Evolution and Paleontology; C. S. Chadwick, Head, Department of Biology, George Peabody College for Teachers—Morphology; Fred R. Cagle, Head, Department of Zoology, Tulane University—Taxonomy; F. R. Hunter, Head, Department of Physiology, Florida State University—Physiology and Health; and Royal E. Shanks, Professor of Botany, University of Tennessee—Ecology and Conservation.

The North Central Conference considered biology from the standpoint of its contributions to daily living. Emphasis was placed on: Health and Disease, Plants and Man, Conservation, Human Inheritance, and Food Supply of Man. Consultants for these areas were: Robert Bowman, Assistant to the Dean, School of Public Health, University of Michigan—Health and Disease; Samuel T. Dana, Dean Emeritus, School of Natural Resources, University of Michigan—Conservation; Harry Fuller, Professor of Botany, University of Illinois—Food Supply of Man; Harold O. Goodman, Assistant Professor of Zoology, Michigan State University—Human Genetics; and John S. Karling, Head, Department of Biological Sciences, Purdue University—Plans and Man. The Southeastern Conference had Samuel L. Meyer, Florida State University, and Richard L. Weaver, University of Michigan, as Co-Directors. The remainder of the staff consisted of: Ned Bingham, University of Florida; George Jeffers, Longwood College; and W. Hugh Stickler, Florida State University.

The Director of the North Central Conference was Richard L. Weaver, University of Michigan. Staff members were: Richard Armacost, Purdue University; John Breukelman, Kansas State Teachers College; Paul Klinge, Howe High School, Indianapolis; and Alfred Stockard, University of Michigan Biological Station.

Participants at both conferences included high school and college biology teachers, high school and college administrators, professors of education, representatives of state education departments as well as several non-regional delegates representing the AIBS, AAAS, National Research Council, and the National Science Foundation. There was a carefully planned balance between scientists and professional educators, teacher-training personnel, high school administrators, college administrators, and high school teachers.

Delegates discussed and made recommendations on teacher education and certification, teaching methods, and biology course content in colleges and secondary schools. State teams met and planned ways for implementing the conclusions and recommendations of the conferences.

The complete report of The Southeastern Conference appeared in the January, 1955 issue of *The American Biology Teacher*, official publication of the National Association of Biology Teachers. All sixty-four pages of this issue are devoted to digests of the contributions of the science consultants, a summary of recommendations on biology teaching and the state team reports for implementation of conference recommendations. A similar report covering The North Central Conference will be published in the January, 1956 issue of the same journal. Copies of both reports can be obtained by writing to Paul V. Webster, Bryan High School, Bryan, Ohio, Secretary-Treasurer of The National Association of Biology Teachers.

It is difficult to pin-point the values derived from these conferences devoted to the study and improvement of biology teaching. Without a doubt, many benefits came from the free exchange of ideas between scientists and professional educators. High school teachers and other participants had the opportunity to hear and consult with competent scientists. A fine spirit of cooperation was evident at both conferences. Consultants, staff, and participants all seemed to be trying hard to understand each other, and to educate themselves so that this understanding might be possible. The result was specific, tangible recommendations which can help the many teachers throughout the country who were not fortunate enough to attend these meetings.

It is too early to evaluate the effectiveness of the proposals of the state teams. Some of the states in the Southeastern Conference region have had local and state meetings at which the conference decisions and recommendations were explained and discussed. Reports have been given at meetings of state academies of science, state teachers meetings, city system meetings, and departmental meetings in high schools and colleges. Many biology teacher training programs are using last year's conference report in their classes for prospective biology teachers, and look forward to the publication of The North Central Conference report. The states in the North Central Conference region are just beginning to put their plans into action.

Both conference reports indicate many other ways the conference summaries can help biology teachers. These reports have been and will continue to be distributed to many teachers throughout the United States. It may be somewhat early to judge, but it seems that the conclusions reached at these conferences promise to have far-reaching effects in the present day effort to improve biology teaching. They represent a firm base on which significant advances in biology teaching can be constructed.

A Report on the AAAS Science Teaching Improvement Program

JOHN R. MAYOR, *Director*

THE action program of the American Association for the Advancement of Science is planned to contribute to the improvement of science and mathematics teaching in the secondary schools, and to increase the supply of college graduates qualified to teach science and mathematics. The program, known as the Science Teaching Improvement Program, was reported in detail in the July 22 number of *Science* and the September issue of *The Scientific Monthly*. The pamphlet, *Science Teaching Improvement Program*, describing the program, will be sent on request addressed to the AAAS office.

Through STIP, the AAAS hopes to work with college and university science departments in their acceptance of teacher education as a major responsibility, to encourage the development of special programs for training science teachers, interest students in becoming science teachers, contribute toward the movements for higher salaries for teachers, conduct studies in the improvement of working conditions for teachers, offer awards to secondary school science teachers for excellence in teaching, and direct a pilot study in four states on the use of science counselors.

Conferences with university and college scientists have been held in Illinois, Oklahoma, Texas, and Louisiana. A panel discussion of scientists on the contributions of colleges and universities to the solution of the problem was held at a special session at the recent Atlanta meeting of the AAAS. Other state and regional conferences are planned for the early spring. Invitations to the staff of STIP to take part in such conferences will be welcome.

Those responsible for STIP are seeking the cooperation of national professional educational organizations, such as the American Association of Colleges for Teacher Education, National Association of Secondary School Principals, Association for Supervision and Curriculum Development, and the national organizations of those who are responsible for teacher certification. Scientists in the various states and state academies of science have been encouraged to work with state branches of these organizations.

The pilot study on use of science and mathematics counselors will be started during the summer of 1956. Already requests to participate in this part of the program have been received from a dozen states. The studies in this area will be centered in a university or college, and carried on with full cooperation of the state departments of education.

Scientists in colleges and universities should seek every opportunity to become familiar with science-teaching programs in the schools, and to know science teachers. Although there is much complaint about the existence of too many pressure groups in secondary schools at this time, it is our responsibility to see that we make ourselves just one more such group. We can help by providing summer institutes for science and mathematics teachers as have been so well started in a number of states, and particularly by offering summer courses which are planned for teachers and in which they can earn graduate credit. We need also to exert every effort to assist the good science teacher in attempting to maintain high standards and to bring about a respect for, and love of, learning.

The most serious problem in the secondary schools at present is probably what has been frequently called, inaccurately, "anti-intellectualism." Many students do not seem to acquire in the secondary schools a desire for knowledge, an ambition to increase the fund of the world's knowledge through their own study and research, and least of all a genuine pleasure from concentrated effort in academic areas. Scientists can help secondary school science teachers to understand that these things are absolutely essential today, and assist them to achieve these ends. If it is recognized that the education of secondary school teachers and the planning of secondary school programs are a major responsibility, contributions can be made not only to the improvement of science teaching, but it may also be possible to reverse a present unhappy trend which is best indicated by absence of scholarly habits among secondary school students.

Scientists have failed in course offerings to help teachers "keep up" with modern developments in science. If some dissatisfaction is felt with the schools, it must be realized that the lack of interest of scientists in secondary schools and lack of recognition of good work are in considerable part to blame. There is no more conscientious and hard-working group of people than secondary school science teachers, and they are very ready to cooperate in any program which may be developed for the improvement of science teaching. They quite properly expect scientists to take the initiative.

The Science Teaching Improvement Program can succeed only with the active assistance of other professional scientific organizations and of scientists in colleges and universities throughout the country. Early response has been very encouraging, and it is hoped that 1956 will see thousands of scientists enlisted for this important work.

During the recent AAAS Meetings in Atlanta, Ga. (Dec. 26-31, 1955) the above committee was instrumental in planning several symposia and panel meetings. In a symposium, "The Crisis in Science Education", Arthur S. Fleming, Director, Office of Defense Mobilization said, "The problem which you are considering this morning is a matter of grave concern from the standpoint of national security. A positive program carried forward with a real sense of urgency is needed if we are to deal with this situation effectively. Here are some "musts" that should be included in such a program. 1. We must raise the level of management competence in the fields of business, government and education. 2. Specific and effective efforts must be made by business, government, and education to utilize more effectively those who have been trained as scientists and engineers. 3. We must develop programs which will enable the scientists and engineers of the free world to work together in an effective manner. 4. Our educational system must provide us with more and better trained scientists and engineers. 5. As a nation we must develop programs that will give national recognition to those who excel in the scientific and engineering fields and to those who help to make it possible for scientists and engineers to excel in their chosen fields of work."

In discussing the fourth "must" Dr. Fleming stated, "When the conscience of America is aroused . . . to the place where teachers are paid a decent salary, we will attract and retain in our secondary school system teachers who will strengthen and improve the curriculum. Furthermore, we will provide these same teachers with adequate facilities. . . . And what is true of secondary education is equally true of the field of higher education. The Ford Foundation and many corporations recognize that our failure to pay reasonable salaries is seriously undermining our system of higher education. And this nation should be eternally grateful to them for their willingness to do something about the problem by making substantial contributions to our colleges and universities."

The Montana State University Biological Station

GORDON B. CASTLE, *Director*

THE Montana State University Biological Station is located on the east shore of Flathead Lake in western Montana. Flathead Lake is approximately 30 miles long, averages 7 miles in width and has 200 miles of shore line. It is an oligotrophic lake with a maximum depth of about 100 meters. The elevation of the lake at high high-water is 2,893 feet. The greater portion of the lake is characterized by narrow, rocky, and gravelly shoal areas; however, the south end of the lake is a large, relatively shallow bay with a muddy and sandy bottom which supports a lush growth of aquatic plants.

The station holding consists of approximately 66 acres of Yellow Bay, of which 40 acres are composed of native forest which has been relatively undisturbed for the last 70 years; 40 acres of low-lying land at the south end of the lake; 40 acres on the south side of Bull Island in the lake and several small islands which are used as nesting sights by many kinds of birds.

By virtue of its location, the Biological Station offers a wide range of ecological areas for teaching and investigation. Within easy driving distance of the station, altitudes ranging from 2,000 feet to over 10,000 feet are accessible. The head waters of the Hudsonian, Mississippian, and Columbian drainages are available for study. The main vegetational types are the Montane and Sub-alpine forests; however the following floristic elements are also available for study: the Boreal, Rocky Mountain, Great Plains, Interior Basin, Coast Forest, and Palouse Prairie. Aquatic habitats include glacial ponds of varying sizes; oligotrophic, eutrophic, and dystrophic lakes; swamps, marshes and bogs; glacier-fed lakes and streams and streams of varying sizes and altitudes. In addition there are impoundments of relatively recent construction. Flathead Lake, itself, is of extreme interest due to the fact that it is one of the few lakes in the northwest which was studied intensively prior to the construction of a dam at its outlet.

Through cooperation with several state and federal agencies, the staff, students, and private investigators are able to carry on research in areas and under circumstances not otherwise available. Projects are conducted independently and in cooperation with biologists and naturalists in Glacier National Park, in the national forests of the area, at the Rocky Mountain Laboratory of the United States Public Health Service at Hamilton, at the National Bison Range at Moiese, on the Ninepipe, Pablo, and Kicking Horse Reservoirs (migratory water fowl refuges under the administration of the Fish and Wildlife Service) with the State Fish and Game Department in many parts of the state, and with the Wildlife Research Unit at the University in Missoula.

In addition to the many varied environments available for study in this region, the fact that the fauna and flora are literally unknown in certain fields of investigation increases the opportunity for research. Botanical research to date has been almost entirely of the preliminary survey type. Unlimited possibilities for research exist in taxonomy, ecology, distribution and comparative morphology. Zoologically, with the possible exception of mammals and birds, western Montana is practically unknown to taxonomists and ecologists. For example, *Microtus richardsoni*, found in many localities at high altitudes in this region, has never been studied in detail. The rare black swift which, biologically, is relatively unknown is readily available for study in Glacier National Park. The flying squirrel,

Glaucomys sabrinus, is abundant on the station ground and offers many problems to the graduate student or investigator. Life history, ecological, and distribution studies of the invertebrates of this area are badly needed.

The staff for the summer of 1955 and the courses which they offered were: R. B. Brunson, Limnology, Field Zoology (Natural History of Invertebrates); Gordon B. Castle, Entomology, Aquatic Insects; Paul Baldwin, Ornithology; L. H. Harvey, Systematic Botany, Agrostology; William Vinyard, Algology, Aquatic Flowering Plants; P. L. Wright, Mammalogy. In addition to teaching courses, each staff member also directed the research of graduate students. The faculty personnel was augmented during the summer of 1955 by the following independent investigators: Gladys Baker and Louis Potter, Vassar College, who were working on the microbiology of Flathead Lake and other waters of the area, G. B. Cummins, Purdue University working on rusts.

The student body is drawn from all parts of the United States and consists of junior, senior, and graduate students who are pursuing either regularly organized course work or research problems.

Current research under way includes studies on the flora of northwestern Montana; a check list of the algae of this area; studies on the distribution and ecology of invertebrates and the coldblooded vertebrates of the area; several studies on the ecology, spawning habits, life history and migration of fish; the breeding habits of the pine martin, *Martes americana;* the reproductive habits of *Sorex vagrans* and *Microsorex;* and population studies of small mammals at Yellow Bay, in Glacier Park, and on the National Bison Range.

The Biological Station offers unusual opportunities for research by virtue of the great variety of habitats available for study and the characteristics of its fauna and flora. Few biological stations in the United States have the variety offered by Montana State University Biological Station. A list of station publications may be obtained by writing to the Director.

Oregon Institute of Marine Biology, Coos Bay

BAYARD H. McCONNAUGHEY, *Acting Director*

THE Oregon Institute of Marine Biology is located on a hundred acre tract along Coos Bay and the ocean front near Coos Head, Oregon. Most of the area is a modified high marine terrace bordered by abrupt slopes and cliffs. Native vegetation and animal life have been conserved as far as possible.

Coos Bay and the surrounding region are of particular biological interest. The bay and its inlets afford a wide range of aquatic environments with differences in salinity, temperature and character of the bottom which are reflected in the flora and fauna. The ocean front between Coos Head and Cape Arago is rugged with numerous rocky promontories, small bays, sand beaches and good reefs exposed at low tide. The tidal level fluctuates as much as nine or ten feet and many excellent low tides occur during the summer session.

The marine life is abundant and varied. The number and diversity of habitats accessible within a few minutes drive of the station, and the fact that these have been relatively little altered by man, makes available to the student unusually rich invertebrate and fish faunas. Over three hundred kinds of marine algae have been listed from the region.

Across from Coos Head are the long ocean and bay beaches of North Spit with their different faunas and floras.

The foothills of the Coast Range exhibit the typical forest associations of the coastal belt of the Pacific northwest. Numerous streams and several coastal lakes bordered by sand dunes are readily accessible. The region abounds with varied bird life including many aquatic species which breed in the vicinity or are visitors during their migrations. Small mammals are abundant and deer are seen occasionally. Seals, sea lions and occasional whales are also seen.

The Institute is operated by the Oregon State System of Higher Education and represents the combined services of the Departments of Biology of its various units.

It owes its inception to the pioneer work of Dr. Harry Yocum and his students in the Coos Bay Area. Since 1937 it has been closely associated with, and operated by, Oregon State College under the direction of Dean Archibald Gilfillan.

A valuable program of teaching and research was developed there by Dr. Yocum prior to the war. Since 1946 this has been expanded and ably carried forward by Dr. Ivan Pratt and his associates. Mention should also be made of the services of "Doc" H. C. Luce, custodian, who for the past ten years has played an important part in the life of the Institute.

In 1955 the State Board of Higher Education delegated the responsibility for maintenance and operation of the station to the Department of Biology, University of Oregon, Eugene. Funds were appropriated for renovation of the buildings and general improvement of facilities. It is hoped that this will enable the Institute to continue its services for students and scientists even more effectively in the future.

The buildings, originally constructed by the Civilian Conservation Corps, have recently been renovated and are ideal for use as dormitories, dining hall, classrooms and laboratories. All are provided with electricity and heated with stoves. The kitchen and shop are well equipped. There are three large laboratory classrooms and a research laboratory, all equipped with running sea water. Separate cottages house the staff and their families.

Some basic equipment is kept at the station but microscopes, chemicals and a working library are borrowed from various units of the Oregon State System of Higher Education for the summer sessions. Additional equipment for advanced work or research can be provided if arrangements are made in advance.

The facilities are available for use by investigators and for field trips by groups throughout the year. The running sea water and most supplies are provided only during the summer session.

The institute offers the undergraduate and non-specialized student an opportunity to study biology in the stimulating atmosphere of the sea shore where representatives of almost all phyla and classes of animals and plants can readily be studied alive. It offers basic courses such as General Zoology, and a number of courses with graduate credit designed to stimulate and help science teachers of the region to make more effective use of the rich biological materials available in the northwest. These include courses in marine ecology, invertebrate zoology, botany, biology of fishes, plankton, and so forth.

The institute also provided advanced students opportunity to undertake more specialized work or to engage in research. There are excellent opportunities for research, especially in taxonomy, ecology, anatomy and life history. Other studies involving field work or not requiring elaborate equipment can also be carried out to advantage.

Scripps Institution of Oceanography, University of California[1]

CARL L. HUBBS, *Professor of Biology*

THE oceanographic branch of the vast University of California is at La Jolla, with an extensive annex on the grounds of the United States Navy Electronics Laboratory on Point Loma—both in the San Diego area. It is an outgrowth of the Scripps Institution for Biological Research, which was founded and so named in 1912, when the University accepted the laboratory of the Marine Biological Association of San Diego. That laboratory was the last of a series of independent marine biological stations established in Southern California by William Emerson Ritter, who continued as director of the institution until 1923. He was succeeded by Thomas Wayland Vaughan, a geologist, during whose administration (1923-1936) the institution continued to grow. In recognition of the expanded activities the name was changed in 1925 to Scripps Institution of Oceanography. Further development has been achieved under the successive directorships of Harald U. Sverdrup, world-renowned Norwegian oceanographer (1936-1948), Carl Eckart (1948-1951), and the present head, Roger Revelle.

World War II emphasized the importance of oceanography to national security and accelerated the growth of Scripps and other institutions devoted to marine sciences and to the training of marine scientists. Since the war there has grown a realization of the peacetime as well as military significance of oceanography. The value of the varied oceanic resources to the state, the nation, and the whole world has become recognized. As a result, increasing support for Scripps Institution has come from various sources: from the state that owes much to the great ocean it broadly borders; from the various military and civilian branches of the nation that depends so much on the knowledge of the sea and on the men who can develop this knowledge; and from several private agencies, such as Rockefeller Foundation and the American Petroleum Institute, that are concerned with the advancement of knowledge, either for the sake of humanity in general or for the welfare of an industry.

Over the past ten years the main parameters of the institution have increased about ten fold. The annual budget now exceeds $3,000,000; the staff approximates 500, including more than 100 scientists; the research fleet has grown from one schooner to five ocean-going ships, including two capable of transoceanic expeditions, plus various smaller craft; and shore facilities include on the 175-acre La Jolla campus five permanent buildings, one now being doubled in size, a 1,000-foot pier, and various minor and temporary structures; and at the Scripps Field Annex, thirteen buildings and adequate dock facilities. But to the staff the sea remains the Institution's main laboratory.

In many ways Scripps Institution is comparable to Woods Hole Oceanographic Institution, but differs in being an integral part of a university. For this reason the training of oceanographers has been, along with concentrated research, a main function of the California institution. Many heads and other staff members of oceanographic departments and laboratories across the nation and in several foreign nations are proudly listed among the Scripps alumni. Except for a limited number of summer apprentices, and for military personnel in short-term courses, only graduate students are enrolled. Currently few other than doctoral candidates are accommodated. Of the approximately fifty students, mostly men, who are in training, nearly all take some part in the organized research programs. The number of new students who can be accepted is limited by factors of space and time, since the institution has greatly outgrown its only moderately expanded quarters and since all members of the faculty are deep in research programs and other activities. Applications are welcomed, however, from students with a compelling interest in some phase of oceanography and with a good foundation in basic sciences (at La Jolla the course offerings are restricted to the marine aspects of the several sciences involved in the

[1] Contributions from the Scripps Institution of Oceanography, New Series, No. 000.

Main campus of Scripps Institution of Oceanography, University of California.

broader interpretation of oceanography). Students are considered for acceptance at Scripps only after having been admitted by the Graduate Division of the Southern Section of the University of California (Los Angeles 24). After enrollment they may pursue an M.S. or Ph.D. degree in oceanography or an A.M. or Ph.D. degree in one of the sciences, such as zoology, botany, microbiology, or biochemistry, that are represented in the faculty on the Scripps campus.

Integrated with the Institution are the Marine Physics Laboratory and the Visibility Laboratory, which are in some respects cooperatively associated with the Navy Electronics Laboratory; the Foraminifera Laboratory, associated with the Geology Division; the Marine Life Research program, which engages in the California Cooperative Fisheries Investigation along with the state Department of Fish and Game, the Federal Fish and Wildlife Service, the California Academy of Sciences, and Stanford University; and various other standing and *ad hoc* projects. The newly organized Institute of Marine Resources, though University-wide, has its administrative and main research center at La Jolla. Its director is Charles D. Wheelock. The extensive research projects in the Gulf of Mexico undertaken under grants from the American Petroleum Institute are now administered by this Institute. Associated intimately with and housed by Scripps Institution are the South Pacific Fishery Investigations of the Fish and Wildlife Service, headed by John C. Marr, and the Inter-American Tropical Tuna Commission, of which Milner B. Schaefer is director. Close cooperation is maintained with the state Department of Fish and Game; with other branches of the University of California and with other universities, laboratories, and societies; and with various state, federal and international agencies concerned with the sea.

For the benefit of the public as well as its own staff and students, the Institution maintains the Thomas Wayland Vaughan Aquarium and Museum. In certain fields research collections are maintained. Scripps has been the authorized center for processing and storing the now voluminous bathythermograph data for the whole Pacific. A well-equipped shop has developed many oceanographic instruments and has otherwise served the instrumental needs of the staff. The Library, with more than 30,000 volumes, 60,000 reprints and pamphlets, more than 800 journals, and a large chart collection, serves the staff directly and through contact with the other libraries. The Institution compiles and distributes each year, as contributions from the Scripps Institution of Oceanography, the scientific papers published by the staff in various journals, and issues, through the University Press, the *Bulletin* of the Scripps Institution of Oceanography and Oceanic Observations of the Pacific.

In large part the strength of Scripps Institution lies in integrated attacks on the physical, chemical, geological, and biological problems of the sea. In former years the researches were largely restricted to the coastal waters of Southern California and northwestern Mexico, but more recently, especially since the war, the operations have covered much of the northern and equatorial Pacific, with extensions into the Gulf of Mexico, the Arctic Ocean, and other waters. Each year since 1950 one or more long expeditions have been undertaken by the Institution's vessels, either alone or with ships of other agencies.

Scripps is a year-round laboratory, with no special summer session and no regular summer courses. Within the limits of outgrown facilities, however, qualified investigators are welcomed and accommodated in summer as well as other seasons.

Biological activities at Scripps Institution are diverse, though all focused on marine problems. The program in biochemistry, headed by Denis L. Fox, stresses such subjects as biochromes and comparative biochemistry of marine organisms and the role of particulate organic detritus in their nutrition. Research in microbiology, under Claude E. ZoBell, has dealt with the constitution of the marine bacterial flora, with the role of bacteria as geochemical agents, and with the biochemistry of marine microorganisms. It now stresses the physiology of bacteria that live under enormous pressures at great depths of the sea. The marine botany section, led by Francis T. Haxo, emphasizes problems related to the basic productivity of the seas, but deals also with other phytoplankton problems and with the physiology and biochemistry of attached marine algae. The work in invertebrate zoology, administered by Martin W. Johnson, deals chiefly with the zooplankton, with emphasis on systematics, life histories, quantitative distribution, and relations to oceanic currents, water masses, and other ecological factors. Dr. Johnson's pioneering work on the deep scattering layer is being extended by special projects. The studies in marine vertebrates, headed by Carl L. Hubbs, deal with the systematics, ecology, and distribution, habits, and reactions of marine vertebrates, both of coastal waters and the high-seas. Included currently is a study of the ecology of man during past periods of the eruption of populations along the coast. The newest division, marine genetics, being developed

by Adriano Buzzati-Traverso, deals not only with the heredity of certain marine organisms, but also with population dynamics and evolution.

The biological work is closely correlated with that of the other divisions—physicial, chemical, and geological. The chemistry division, for example, deals with nutrient cycles, with the accumulation of trace elements by organisms, and with the relations between radioactive elements and marine organisms. A new laboratory for C^{14} and O^{18} analysis will greatly benefit paleoecological researches. Biological research at Scripps is further expanded by cooperation with the associated fisheries laboratories, other state and federal fishery agencies, and such other institutions as the California Academy of Sciences and the San Diego Zoological Society.

The biological program at Scripps Institution is being rapidly accelerated by reason of a one-million dollar eight-year grant from the Rockefeller Foundation. Under this subsidy particular stress will be laid on fresh experimental attacks on marine biological problems. Several new staff members, postdoctoral fellows, predoctoral fellows, and visiting researchers will be supported. Applications are being received.

Reelfoot Lake Biological Station

C. L. BAKER, *Director*

THIS inland biological station is located on Reelfoot Lake in the north-west corner of Tennessee; eight miles south of Kentucky and two miles east of the Mississippi River. The lake, once a bend of the Mississippi River, is eighteen miles long and varies from two to four miles wide. Portions of the lake are swamps and marshes with approximately 15,000 acres of open water and enclosing 45,000 acres. The biological station is located on the east side of the lake at the village of Walnut Log which is twelve miles south of Hickman, Kentucky and twenty miles west of Union City, Tennessee.

This station was established by the Tennessee Academy of Science in 1931 by the State of Tennessee leasing land and a building to the Academy for the "establishment of a Biological Station for carrying on scientific research." An appropriation has been made each year since 1931 by the General Assembly of Tennessee to the Academy for the operation of the station and at present this sum is $3,000 annually.

The purpose of the station is to provide research facilities to qualified investigators of educational institutions of Tennessee and neighboring states, and to pursue research on problems dealing with the conservation of the natural resources of the area; particularly forests, fish and game. No limits, however, have ever been placed on the residence of the investigators or the type of research carried on.

The station is located on the bank of a bayou that flows into the lake and is a well built cypress building fully equipped with accommodations for twelve workers. The understructure has a cement floor, is equipped with a store room, machine shop and houses gas and water plants. There is a dark room for photographic work and deep well water is piped to the laboratory aquaria. Motor boats are also available.

Living facilities are limited at the station. Walnut Log Lodge is a well appointed, comfortable hotel adjoining the laboratory where workers have lived in the past at moderate rates. This lodge is operated by private interests and has no connection with the biological station. During the past ten years the resident investigators have found it expedient to board and room or "batch" in the station and consequently living quarters have been developed that are quite satisfactory for eight male investigators.

The station is open during June, July and August for regular resident research and by appointment only during the rest of the year. No class instruction is offered and residence is limited to investigators who can pursue their research without immediate direction.

A wide variety of research personnel and science students use the station for varying periods in a manner somewhat as follows:

a. Two to four researchers of the United States Public Health Service work on some phase of mosquito and malarial investigation.

b. Travelling groups of biologists from museums, state departments of fish and game, Tennessee Valley Authority and United States Division of Fish and Game stop over for a few days or a week or more to use the station as their headquarters.

c. Groups of students from nearby colleges and universities spend brief periods, usually week-ends, studying natural history of the vicinity and collecting specimens.

d. Classes of county school children visit the station to see the museum exhibits and listen to informal lectures on the region.

e. Scholarships are awarded by the Tennessee Academy of Science and the recipients engage in research in residence for periods of two to twelve weeks. These scholarships cover all expenses of board and room and routine laboratory materials. In return the worker is expected to submit the results of his research for possible publication in the annual Report of the Reelfoot Lake Biological Station.

This Annual Report has been published since 1937 and reprints of it are used for the January issue of the *Journal of the Tennessee Academy of Science*. In this manner the author's article is printed in approximately 2,000 copies of a recognized scientific publication within three months after being submitted.

Reelfoot Lake was originally a cypress swampland until the great New Madrid earthquake of 1811-12 resulted in partial submergence of swamp areas and emergence of adjacent land areas and produced a broad expanse of open lake that still retains numerous swamp regions. The lake is shallow and has wide seasonal fluctuations in water level and this has led to the development of abundant hydrophytic vegetation and its flood plain. Between these flood plain swamps and the open water of basins there are broad littoral zones composed of many aquatics. Many angular and shallow embayments support great masses of vegetation. The area is nationally famous as a superb hunting and fishing ground and is a part of the Mississippi Flyway for migratory water fowl. Cranetown is a fifteen acre plot in a very inaccessible deep swamp region where approximately 450 nesting egrets hold forth each spring.

The area offers tremendous opportunities for research in many fields of Ichthyology, Herpetology, Limnology, Aquatic Biology, Ecology and particularly Parasitology. The abundance of materials, the geographical location and the isolation of the station from commercial interests tend to attract the serious investigator. It is, however, not a health resort. There are six biological stations surrounding this area, each approximately 600 miles distant. None of them have comparable fauna and flora nor are they located in similar localities.

The results of research at the station have been published in more than 100 papers during the twenty years of operation. Some of these investigations are as follows: A creel census of fishermen's catches; food habits of fishes and game birds; a general survey of all amphibians, fishes, reptiles and birds of the lake; the blood flukes of the family Spirorchidae with a description of nine new species; the larval flukes with a description of a new species of mother sporocyct and eleven new species of cercariae; a seventeen year study of growth rate of game fishes; surveys of fish parasites with a description of the new species *Actinocleidus bakeri;* a study of an egret heronry where some 450 nests are used each year by these beautiful migratory birds; considerable experimentation in eradication of aquatic plants with herbicides and mechanical devices; publication of a map of the lake and adjacent area showing habitat areas, depths, etc.; the discovery that *Anopheles walkeri* transmits human malaria; the natural history and morphology of *Amphiuma tridactylum.*

This undeveloped research region remains a "parasitologist's paradise and a parasite's heaven" for there is an abundance of material still to be studied. Those biologists who prefer the swamps, the marshes and heavily wooded areas will find a wealth of organisms that need further investigation.

Copies of the Annual Report are available and further information can be obtained by writing the Director: Dr. C. L. Baker, Professor of Biology, Southwestern College, Memphis, Tenn.

The Virginia Fisheries Laboratory

J. L. McHUGH, *Director*

RESEARCH, graduate teaching, and public education are the three main functions of the Virginia Fisheries Laboratory. Established as an independent state agency in 1940, but affiliated with the Commission of Fisheries, the College of William and Mary, and the seafood industry, through a Board of Administration composed of representatives of each group, the Laboratory performs broader functions than its name implies. So-called applied research is not the sole concern of the program, and many problems under investigation are pursued for the sole purpose of adding to biological knowledge, a worthy objective in itself.

The main building, of two-story, brick and cinder-block construction, contains offices of the Director, Office Supervisor, Secretary, and Education Supervisor, on the first floor. Here also are two student laboratories, a stationery storeroom, preparation room, public exhibit room, darkroom, furnace room, and rest rooms.

Upstairs are seven offices for scientific staff, a stenographers' cubicle, chemical laboratory, equipment storeroom, constant temperature room, a large general-purpose laboratory, library and reading room, kitchen, semi-darkroom for microfilm and scale reading, a small dormitory, and two rest rooms with showers.

At the base of the pier is a two-story brick workshop, wet laboratory, and storage loft. The workshop is equipped with hand tools, a power saw, planer, band saw, and drill press. Also in this building is a walk-in cold-storage room.

A substantial pier, with creosoted piling and oak deck, is wide enough to allow passage of an automobile. Extending from the end of the pier, at right angles to its axis, is a series of catwalks and racks from which oyster trays, spat collectors, and other experimental devices may be suspended in the water. On this pier are two electrically-driven centrifugal pumps that provide a continuous supply of salt water through lead pipes to the student laboratory, exhibit room, upstairs laboratory, and five outdoor concrete tanks.

Floating equipment includes a 50-foot motor vessel, a small launch, and several small boats with 10 and 25 horsepower outboard motors. A 55-foot diesel-powered research vessel, now in the developmental stage, is expected to be ready early in 1956.

The present buildings are insufficient to provide adequate quarters and storage space for a staff and student body which, at its peak in the summer of 1955, numbered 38 people. Plans are underway to construct three new buildings within the next fiscal biennium, a new laboratory, a service building, and a dormitory-dining hall. When these new facilities are available, the program of fundamental research will gain momentum.

The Laboratory is situated on the York River, directly across from historic Yorktown, and about six miles upriver from Chesapeake Bay. Salinities usually range from 16 to 24 parts per thousand, and temperatures from 32 to 90 degrees Fahrenheit (0 to 32° C.). Located as it is in the center of an important fishing region, and on one of the largest estuaries in the world, with freshwater and strictly marine environments within easy reach, this institution is close to a variety of interesting biological habitats.

Although the Chesapeake Bay region has been settled since colonial days, its aquatic fauna and flora are not well known, and only the fishes, the molluscs, and the decapods have been catalogued adequately. Estuarine ecology presents many special problems, but it is important first to know what organisms inhabit these waters. Accommodations for visiting scientists who might help with this task are very limited, but the new construction will make such studies possible.

Close cooperation is maintained with other laboratories in the region, especially the Chesapeake Bay Institute of The Johns Hopkins University, the Chesapeake Biological Laboratory of the Maryland Department of Research and Education, and the Annapolis Shellfish Laboratory of the U. S. Fish and Wildlife Service. The services of the Chesapeake Bay Institute are available in connection with problems involving the physical or chemical variables in the environment, and the two laboratories also exchange graduate students for brief training in Physical and Chemical Oceanography and Biological Oceanography respectively.

The fisheries of the Chesapeake Bay are dominated by the invertebrates. Oysters and blue crabs, in that order, are the major commercial species, but many fishes also are taken, including menhaden, croaker, gray sea trout, spot, and flounder. Sport fishing is good during most of the year, and the recreational possibilities are unlimited. The research program embraces studies of oyster spawning, setting, growth, and mortality, including work on diseases and predators; growth, spawning, and availability of the blue crab; and distribution, age and growth, spawning, and availability of fishes. Studies of the biology of molluscs, crustacea, and fouling organisms, and of the physiology of fish muscle are underway, and a parasitologist will be added to the staff this fall. The scientific staff of twelve is augmented in summer by two visiting professors, who spend half their time in teaching and half in research in their special fields of interest.

A Master's degree in Biology is offered, in coordination with the College of William and Mary. The student takes up residence at or near the Laboratory, about fifteen miles from the campus, and is required to take courses in Williamsburg only when necessary to complete prerequisites lacking in his undergraduate training. Five half-time research assistantships are available, and all are filled at the date of writing. Course offerings include Invertebrate Ecology, Biology of Fishes, Physiology of Marine Organisms, Fisheries Biology, and Biometry. Field work and research are emphasized, and students are encouraged to participate in all phases of the regular research program of the Laboratory.

The public educational program includes many visits by elementary and high-school classes to the Laboratory for a day's introduction to marine biology and fisheries. Visits are made also to the schools on request, and many talks are given to teachers' groups, service clubs and other public groups, sportsmen's and commercial fishermen's organizations, and the like. A regular series of television programs is produced bi-weekly from a local station, and occasional television and radio programs are presented as requested. Exhibits are placed in fairs and other public meetings, and a public exhibit room, with both live and demonstration exhibits, is maintained in the Laboratory.

Scientific articles, designated as contributions of the Virginia Fisheries Laboratory, are published in the existing journals. Bound series of Contributions, issued every second year, were prepared first in 1951-52, for distribution to libraries. Individual reprints are available on request. Other publications include Special Scientific Reports, usually of restricted scope and not widely distributed; an Educational Series, produced mainly for use in the schools, and for distribution in response to requests for information; and a biennial report, printed with the biennial reports of the Commission of Fisheries.

1956 AIBS MEETINGS

The 1956 AIBS-sponsored meetings of biological societies will be held at the **University of Connecticut, Storrs, August 26 to 30.** Advanced registration and housing forms will appear in the April issue of the **AIBS *Bulletin*.**

The Rocky Mountain Biological Laboratory

W. H. EMIG

THE Rocky Mountain Biological Laboratory will hold its 29th annual six weeks summer session in 1956. The laboratory is located at the foot of Gothic Mountain at an elevation of 9,500 ft., 8 miles from Crested Butte, 36 miles from Gunnison, Colorado. The Gothic Area comprises a half million acres of virgin territory; high mountains with regions of perpetual snow, alpine meadows, lakes, streams, aspen and coniferous forests. In 1930 the United States Forest Service set aside the Gothic Natural Area in the Gunnison National Forest, a permanent research tract of 900 acres two miles from the laboratory. This area is equally divided into alpine habitats and subalpine fir and Engelmann spruce forests.

Students and members of the teaching staff live in rustic cabins; meals are served in a separate dining hall. Two laboratories are in constant use and a third is planned. Construction has been started on a library building of native stone to house current textbooks in biology and abstract periodicals.

Special emphasis is given to outdoor laboratory exercises. Numerous species of algae which occur in small quantities during July are abundant in September. Fungi, too, are widespread throughout the aspens and in coniferous forests after a few days of rain. Parasitic fungi prevail throughout the growing season. Many kinds of liverworts flourish in special habitats; more than a hundred species of mosses may be collected in a short time. Ferns and fern allies are limited in quantity but are widely distributed. The flora includes the same forms that are found in the Rocky Mountain National Park but the vegetation is more prolific at Gothic. The order of appearance of flowers follows a taxonomic pattern that begins with monocots and buttercups continuing through a sequence of families until the Compositae dominate the growing season.

Research in ecology is most active among graduate students who are able to continue the study of a problem through several seasons. Invertebrates are found at all elevations up to the snow fields. Saprophytic and parasitic protozoa, nematodes and cestodes are abundant. The parasitic forms are present in amphibia, birds, rodents, and some of the larger mammals. Insects are quite varied and may be collected at all altitudes.

Four or more subjects are taught each session. A student may select two courses for a total of 6 semester credits which are earned in six weeks of classes. The members of the teaching staff follow a three-year plan of rotation. All instructors hold the degree of Doctor of Philosophy.

The fields of study or research and staff members are: *Ecology:* A. O. Weese, University of Oklahoma; Harold M. Hefley, Mississippi Southern College; C. Lynn Hayward, Brigham Young University; and H. G. Barclay, University of Tulsa. *Field Botany:* W. H. Emig, University of Pittsburgh; H. G. Barclay, University of Tulsa; W. A. Weber, University of Colorado. *Parasitology:* Col. George W. Hunter, III, Fourth Army Area Medical Laboratory; Reginald D. Manwell, University of Syracuse; and John C. Johnson, Edinboro College. *Mammalogy:* H. B. Sherman, University of Florida; Paul T. Wilson, College of Marin; R. L. Strecker, Miami University. *Geology for Biologists,* by A. N. Murray, was offered in 1955. *Ornithology, Field Zoology, Entomology* and *Conservation Education* are also offered whenever there is demand by six or more students.

A graduate student seminar in *Evolutionary Biology and Genetics* has been given, without credit, under the direction of one or more of the following: C. S. Pittendrigh, Princeton University; Edward Novitski, University of Missouri; Charles L. Remington, Yale University; and R. P. Levine, Harvard University.

For additional information and the 1956 announcement write to: Prof. John C. Johnson, Director, Rocky Mountain Biological Laboratory, Edinboro College, Edinboro, Pennsylvania.

Across the Editor's Desk

• International Congresses are in the news. Two new ones of interest to biologists have been announced. **The III International Congress on Animal Reproduction** will be held at Cambridge, England, June 25-30, 1956. Papers will be organized under three main headings: physiology, pathology, and artificial insemination, with plenary sessions each day. Further information and copies of the preliminary program may be obtained from Dr. Joseph Edwards, Secretary, III International Congress on Animal Reproduction, Milk Marketing Board, Thames Ditton, Surrey, England.

The First International Congress of Human Genetics is scheduled for August 1-6, 1956 in Copenhagen, Denmark. National committees or representatives have been appointed in various countries by local societies or scientists. The U.S. representatives are **Franz J. Kallmann, F. Clarke Fraser, C. Nash Herndon, Phillip Levine, Clarence P. Oliver,** and **Sheldon C. Reed,** who are sponsored by the American Society of Human Genetics and the American Eugenics Society. Plenary sessions will be held each morning and papers divided into seventeen subject sections during the afternoon sessions. Applications to present a paper must be received by April 1, 1956 and advanced registration should be made by that date also. Information, registration and hotel accommodation forms may be obtained by writing to The First International Congress of Human Genetics, 14, Tegensvej, Copenhagen, N.

In the last (October) issue of the *Bulletin* attention was drawn to the **Tenth International Congress of Entomology** to be held in Montreal, Canada, August 17-25, 1956 and the **Twentieth International Physiological Congress,** to be held in Brussels, Belgium, July 29-August 4, 1956.

• **The 21st North American Wildlife Conference** will be held March 5-7, 1956 at the Jung Hotel, New Orleans, Louisiana. As usual the Conference will be sponsored by the Wildlife Management Institute. The theme of the 21st meeting will be "Pulling Together for Conservation." Approximately sixty papers are scheduled, numerous small sessions planned and the annual meetings of several wildlife organizations arranged for this period. Transactions of the Conference will be available ($2.75) at the registration desk or from the Wildlife Management Institute, Wire Building, Washington 5, D.C.

• **The 69th meeting of the American Association of Anatomists** will be held at Milwaukee, Wisconsin, April 4-6, 1956, by invitation of the Marquette University Medical School. Titles and abstracts of papers and demonstrations must reach the Program Secretary, Dr. P. O. Jones, University of Buffalo, 3435 Main St., Buffalo 14, N.Y., by January 9, 1956. Hotel reservations should be made at the headquarters hotel, the Schroeder Hotel, 509 W. Wisconsin Ave., Milwaukee.

• **A recent pilot study of how the public gets and reacts to science news revealed an impressive interest in science stories and a desire for more extensive coverage.** The study was sponsored by the National Association of Science Writers and New York University with the aid of a grant from the Rockefeller Foundation and was carried out by the Survey Research Center of the University of Michigan. It involved 200 people, half from metropolitan Chicago and the remainder from two rural counties in upstate New York. The answers obtained were obviously not representative of the country as a whole but were indicative and seem to warrant a further, more comprehensive study. The results of this pilot study showed that: three-fourths of the people interviewed read science news; half of them wanted more coverage; better educated readers were more likely to read science news; farm dwellers were less interested in science news than city dwellers; differences in age and income had no relation to the desire for science news; those who had had science courses in high school were more avid science readers; those who read several newspapers or magazines were the heaviest science readers; and TV fans read less science news than others. TV, so far, appeared to not play a large role in transmitting science news but it was felt to be potentially an important means of communication. It was found that most of the 200 persons interviewed had formed a definite picture of a scientist—his outstanding characteristics were superior intellect, dedication to work, and absentmindedness!

• **The 12th Annual Conference on Protein Metabolism,** sponsored by the Bureau of Biological Research of Rutgers University, will be held January 27-28, 1956. The subtitle of the Conference will be "Amino Acid Supplementation." The speakers and their topics are: Edmund S. Nasset, Univ. of Rochester, "Essential Amino Acids and Nitrogen Balance"; Conrad A. Elvehjem, Univ. of Wisconsin, "The Effects of Amino Acid Imbalance in Maintenance and Growth"; Leon L. Miller, Univ. of Rochester, "Amino Acid Metabolism in the Perfused Liver"; Paul György, Univ. of Pennsylvania, "The Liver in Protein Nutrition"; L. Emmett Holt, Jr., New York University, "The Amino Acid Pattern for Children in Health and in Disease"; James G. Allison, Rutgers University, "Supplementation with Methionine." All interested in attending are cordially invited to write to Dr. William H. Cole, Rutgers University, New Brunswick, N.J. for registration forms.

• **Graham DuShane** will take office as editor of *Science* and the *Scientific Monthly* January 1, 1956. Dr. DuShane is on leave of absence from Stanford University where he is Professor of Biology. An embryologist, his research has been in the field of amphibian morphogenesis. He has had wide teaching experience and a long-standing interest in scientific publications.

• **The National Science Foundation** recently announced the appointment of two persons to the Office of Scientific Information. **Alberto F. Thompson** was named Head of the Office and **Clyde C. Hall** assumed the position of Public Information Officer. Dr. Thompson has been with the Atomic Energy Commission for the past seven years as Chief of Technical Information and is a chemist. Mr. Hall goes to the Foundation from the Civil Service Commission where he was Special Placement Representative.

An appointment of interest to biologists at NSF is that of **John T. Wilson** as assistant director of the Division of Biological and Medical Sciences. Dr. Wilson has been serving for some time as program director for psychobiology.

Ralph Mayhew, who has been project director of the National Register of Scientific Personnel at NSF since its inception resigned recently and has been succeeded by **Allen O. Gamble.** Dr. Gamble, a psychologist, has been with the National Advisory Committee for Aeronautics.

• **Willard E. Givens,** former Executive Secretary of the National Education Association, has been elected the new chairman of the U.S. National Commission for UNESCO. Until his retirement in 1952, Dr. Givens served 18 years with NEA. He has been associated with UNESCO since its formation and has toured many nations in connection with education projects.

• **The National Science Foundation has announced that 225 grants, totaling about $3.46 million,** were awarded during the quarter ending September 30, 1955 for the support of basic research in the natural sciences, for conferences in support of science, and for exchange of scientific information. Since the beginning of the program in 1951, over 1,875 such awards have been made, totaling about $20.84 million.

The next closing date for receipt of research proposals in the life sciences by the Division of Biological and Medical Sciences, is February 1, 1956. Proposals received prior to that date will be reviewed during the spring meetings of the advisory panels. Proposals received after February 1, cannot be reviewed until the fall of 1956.

• **Joseph L. Lilienthal,** Professor of Environmental Medicine at Johns Hopkins School of Hygiene and Public Health, died suddenly November 19th. Dr. Lilienthal was chairman of the AIBS Advisory Committee in Physiology to the Office of Naval Research.

• **Samuel R. M. Reynolds,** Director of the Department of Embryology at the Carnegie Institute of Washington, became head of the Department of Anatomy at the University of Illinois Chicago Professional Colleges, effective January 1.

• **William K. Baker** has been named associate professor in the Division of Biological Sciences, University of Chicago. Dr. Baker, a geneticist, was formerly at the Oak Ridge National Laboratory.

• **William J. Crozier,** Professor of General Physiology at Harvard University and an authority on human vision, died November 2, 1955.

• **Karl F. Heumann,** who has been Director of the Chemical-Biological Coordination Center at the National Research Council, has resigned to work with *Chemical Abstracts* at Ohio State University. George A. Livingston has been named acting director of the Center.

• **Sanford S. Atwood,** botanist and Dean of Cornell University Graduate School, has been named provost of the University.

• **The 1956 meeting of the Society of American Bacteriologists** will be held at the Shamrock Hotel, Houston, Texas on April 29-May 3, 1956. Abstracts of papers to be presented must reach the Chairman of the Program Committee, Dr. Orville Wyss, University of Texas, Austin, Texas by February 2, 1956. Four symposia are being planned on the following topics: petroleum microbiology, microbiological problems in the fermentation industry, problems of teaching microbiology, and the Enterobacteriacae. Informal round tables are also scheduled and anyone wanting to participate should contact Dr. Paul Donaldson, Southwestern Medical School, University of Texas, Dallas, Texas.

• **A Symposium on "Perspectives in Marine Biology"** will be held at the University of California's Scripps Institution of Oceanography, La Jolla, California, March 24-31, 1956, under the joint sponsorship of the Office of Naval Research and the inviting laboratory. The Symposium has been officially approved by the International Union of Biological Sciences.

Discussion will center on potential developments in marine biology rather than on past accomplishments. Among the participants will be: from abroad, E. Baldwin, C. Barigozzi, H. Barnes, C. Boquet, P. Dohrn, P. Drach, J. Hämmerling, A. C. Hardy, S. K. Kon, R. Margalef, Y. Matsui, D. Miyadi, G. Montalenti, R. J. Pumphrey, K. M. Rae, A. Remane, R. Riedl, W. Rodhe, W. H. Thorpe, G. Thorson, V. and L. Tonolli, D. P. Wilson, G. M. Yonge, L. Zenkevitch, E. Zeuthen; from the United States, D. I. Arnon, L. R. Blinks, F. A. Brown, T. H. Bullock, E. W. Caspari, E. S. Guzman Barron, A. D. Hasler, G. E. Hutchinson, V. L. Loosanoff, D. Mazia, A. Novick, C. S. Pittendrigh, C. L. Prosser, L. Provasoli, D. L. Ray, A. C. Redfield, F. K. Skoog, S. Spiegelman, H. Staiger, R. Y. Stanier, A. Szent-Gyorgyi, L. Szilard, T. H. Waterman, W. Weiser and P. Weiss.

Accommodations are available for approximately twenty-five additional participants. Some of these may be graduate students in biology, who may attend upon recommendation by the head of their department and acceptance by Scripps Institution; some financial support will be made available to the graduate students. The proceedings will be published by the University of California Press. Persons wishing to attend should write to: A. A. Buzzati-Traverso, Scripps Institution of Oceanography, La Jolla, California.

• **Walter H. Hodge,** formerly Assistant Head, Plant Introduction Section, USDA, Beltsville, Md., has been appointed Superintendent, Dept. of Education, Longwood Gardens. Through this new department, the informational value of the horticultural displays and other facilities of Longwood Gardens will be increased to benefit the visiting public, amateur groups, plant societies, and botany students. **Donald G. Huttleston,** has also joined the staff of Longwood Gardens, as Taxonomist. Dr. Huttleston was formerly Taxonomist at the Brooklyn Botanic Garden and will devote his efforts at Longwood to the identification of the collections and research on ornamental plants.

• **An annual award of $250 has been established by Henry and Ida Schuman of New York City for an original prize essay on the history of science and its cultural influences.** The competition is open to undergraduate and graduate students in any American or Canadian college, university or institute of technology. Papers should be approximately 5000 words in length, exclusive of footnotes, and thoroughly documented. It is hoped that the prize-winning essay will be suitable for publication in *Isis*, journal of the History of Science Society.

The subject, "History of Science and its Cultural Influences" may be broadly interpreted. The papers may deal with the ideas and accomplishments of scientists in the past; may trace the evolution of particular scientific concepts; or study the historical influences of one branch of science upon another. The phrase "cultural influences" is taken to include studies of the social and historical conditions that have influenced the growth of science, or the effects of scientific development upon society in the realms of philosophy, religion, social thought, art and literature, economic progress, etc. Essays dealing with medical subjects are not acceptable, although papers dealing with the relations between medicine and the natural sciences will be welcomed. Papers submitted for competition should be sent to the Chairman of the Prize Committee, Dr. Charles C. Gillispie, Dept. of History, Princeton University, Princeton, N.J. Inquiries about the competition may also be addressed to Dr. Gillispie. June 1, 1956 is the deadline for receipt of papers. The announcement of the prize-winning essay will be made at the annual December meeting of the History of Science Society.

• **The Biological Laboratory, Cold Spring Harbor, will offer three specialized courses during the summer of 1956** to acquaint research workers with the most important techniques used in bacterial virus research, bacterial genetics, and genetics of fungi. The course, *Bacterial Viruses*, will be held from June 18 to July 7, *Genetics of Fungi* from July 11 to July 31, and *Bacterial Genetics* from August 2 to August 22. The course on *Genetics of Fungi* is being offered for the first time this year, and G. Pontecorvo of the University of Glasgow will be in charge. A limited number of fellowships covering part of the tuition fees will be available for graduate students. In addition, research facilities for work on microbial genetics throughout the summer will be available to a limited number of independent research workers. Information may be obtained from the Biological Laboratory, Cold Spring Harbor, Long Island, New York.

• **Marine scientists of nine nations gathered in Tokyo October 17-25, 1955 for three UNESCO-sponsored meetings designed to pool scientific knowledge for the exploitation of marine resources.** Roger R. Revelle of the Scripps Institution of Oceanography, University of California, represented the United States. Representatives of marine science institutes in the Indo-Pacific region met for two days; a symposium, on physical oceanography, was held Oct. 19-22; and UNESCO's newly-formed International Advisory Committee on Marine Sciences met Oct. 24-25. This Committee, which was formed in accordance with a resolution of UNESCO's Eighth General Conference, aims at international coordination of research on oceanography and marine biology. A major subject of discussion was UNESCO aid to research workers in oceanography. The scientists pointed out that effective international cooperation could advance practical applications of the marine science. French experiments in harnessing, for industrial use, the difference in temperature between sea water at great depths and on the surface were discussed, and the Committee received a number of proposals for projects, including the study of cosmic dust, the measurement of ocean salinity, and submarine geology. It was also proposed that UNESCO assist marine research by supplying equipment, research apparatus, and measuring instruments.

• **The International Congress of Anatomists recently adopted over 5600 standard terms in anatomy,** to be published as "Nomina Anatomica" in French, English and German. The result of over 60 years of work by anatomists, this standard list is being printed now through the assistance of UNESCO.

• **UNESCO is studying the possibilities of issuing an international library card** that would give its holders access to university and research libraries in all countries participating in the scheme. Holders of the card would be able to consult books, periodicals, collections, microfilms, etc., without having to obtain prior permission from the libraries concerned.

• ***Federal Funds for Science*** is the fourth report of its kind issued by the National Science Foundation to provide data on funds made available by Government agencies in support of scientific research and development. Fiscal years 1954, 1955 and 1956 are covered—the last two estimated. Actual Federal expenditures for 1954 were over $2 billion. This represents a 20-fold increase since 1940. Less than 7 percent of the 1954 total, however, was obligated for basic research ($116,000,000).

• **The Office of Naval Research Advisory Panel for Microbiology** has announced the appointment of three new members: Alto E. Feller, University of Virginia, A. F. Rasmussen, University of California (Los Angeles), and Robert W. Stone, Pennsylvania State University. Other members of the Advisory Panel are: J. R. Porter, State University of Iowa, Norman F. Conant, Duke University, Herbert R. Morgan, University of Rochester, Emil M. Mrak, University of California (Davis), and William D. McElroy, Johns Hopkins University, Baltimore. The next meeting of the Advisory Panel will be held in the spring of 1956. Proposals for ONR support of research in Microbiology to be reviewed at this meeting must be submitted before March 1, 1956.

• **Detlev W. Bronk,** President of the Rockefeller Institute for Medical Research, New York City, has been elected the new Chairman of the National Science Board, governing body of the National Science Foundation. Dr. Bronk succeeds Chester I. Barnard. Dr. Bronk is also President of the National Academy of Sciences—National Research Council.

Paul M. Gross, Dean of Duke University, Durham, N.C. has been elected Vice-Chairman of the NSF Board and Chairman of the Executive Committee. Dr. Gross is also President of the Oak Ridge Institute of Nuclear Studies.

• **Ten predoctoral and four post-doctoral National Science Foundation Scholarships will be available for study and research at the Duke University Marine Laboratory, Beaufort, N.C. for the summer of 1956.** The predoctoral scholarships are open to graduate students from any institution; the post-doctoral scholarships are limited to applicants from the Southeast. Applications must be completed by April 1, 1956. Forms and information may be secured from Dr. I. E. Gray, Dept. of Zoology, Duke University, Durham, N.C.

• **The First International Symposium on Venereal Diseases and the Treponematoses** will be held at the Statler Hotel, Washington, D.C., May 28-June 1, 1956. The Symposium will be sponsored by the Public Health Service, U.S. Dept. of Health, Education, and Welfare, and the World Health Organization. It is open to all physicians, scientists, and professional health workers interested in participating. Anyone wishing to submit a paper for consideration by the Program Committee should send an abstract to Dr. C. A. Smith, Medical Director, Chief, Venereal Disease Program, Public Health Service, Dept. of Health, Education, and Welfare, Washington 25, D.C. by February 1, 1956. The working languages will be French, Spanish, and English.

• **Dwight E. Gray,** who has been Chief of the Technical Information Division of the Library of Congress for the past five years, has accepted an appointment as Program Director for Government Research Information in the Office of Scientific Information of the National Science Foundation.

• **The First International Congress of Developmental Biology** will be held at Brown University, Providence, R.I., from July 23-26, 1956. It is being sponsored by the International Institute of Embryology, a section of the International Union of Biological Sciences. The organizing committee of the Congress (Paul Weiss, Chairman, E. G. Butler, George W. Corner, Louis B. Flexner, J. S. Nicholas, B. H. Willier, and J. Walter Wilson) has scheduled the following program: Monday a.m.: Registration; Monday p.m. and Tuesday a.m.: Two invitational symposia held concurrently, "Regeneration in Vertebrates", and "Embryonic Nutrient Requirements." Tuesday p.m. and Wednesday: Delivery of free papers by Fellows and members of the IIE and introduced speakers. Each member of the IIE may read a paper from the platform. Each Fellow will be allowed two papers, one or both of which he may yield in favor of a speaker to be introduced by him.

The Congress will be followed by a **Symposium on Cytodifferentiation** (sponsored by the International Union of Biological Sciences) on July 27-31, 1956. Active participation in this conference will be limited to the members of the invited panel; the sessions, however, will be open to all registrants of the Congress.

The registration fee for the Congress will be $5.00; room and board at Brown University will be at a flat rate of $7.00 per day. Applications for accommodations as well as inquiries about local arrangements should be sent to Prof. J. Walter Wilson, Dept. of Biology, Brown University, Providence, Rhode Island.

From the Societies

• The officers for 1955-56 of the **American Society of Zoologists** are: President: Viktor Hamburger; Vice-President: Harold H. Plough; Treasurer: Theodore L. Jahn; Secretary: Rudolph T. Kempton, Vassar College, Poughkeepsie, N.Y.

• **The American Society of Human Genetics** elected the following officers for 1955-56: President: Sheldon C. Reed; President-Elect: Curt Stern; Vice-President: Madge T. Macklin; Treasurer: W. E. Heston; Secretary: Eldon J. Gardner, Dept. of Zoology, Utah State Agricultural College, Logan, Utah.

• **The Western Section of the Ecological Society of America** will hold its annual meeting at Seattle, Washington, June 18-23, 1956. Inquiries about this meeting should be directed to Dr. Cornelius Muller, Dept. of Botany, University of California, Goleta, Calif.

• **Robert Platt, Chairman of the Committee on Microenvironment of the Ecological Society of America, is arranging an Environmental Instrumentation Exhibit for the Storrs, Connecticut meeting next August.** Dr. Platt is soliciting suggestions for the exhibit and would welcome communication with anyone possessing instruments of special interest. Address: Dept. of Biology, Emory University, Emory University, Georgia.

• **The American Bryological Society** would like to draw attention to the following appointments and changes amongst their membership: Emanuel D. Rudolph from the Missouri Botanical Gardens to Wellesley College; Hugh Mozingo from Florida Southern College to Michigan State University; William L. Culberson from Farlow Herbarium to Duke University; Mason Hale from Wichita University to West Virginia University; D. G. Catcheside from Adelaide, South Australia to the University of Birmingham, England; Antero Vaarama from Finland State Horticultural Institute to the University of Turku, Finland.

• **Constantine J. Alexopoulos,** Professor of Botany at Michigan State University, and Secretary of the Mycological Society of America, has been appointed Professor and Head of the Department of Botany at the State University of Iowa, effective the summer of 1956. Dr. Alexopoulos recently returned from a year abroad on a Fulbright Fellowship, collecting and studying the Myxomycetes of Greece.

• **The Society of General Physiologists,** who plan to meet with AIBS at the University of Connecticut in 1956, are arranging a symposium on Temperature Effects and Adaptation to Temperature Changes. The organizing chairman is Frank Johnson, Princeton University.

• **The American Society of Limnology and Oceanography announces the publication of a new journal** which will accept original research papers in all aspects of aquatic sciences. *Limnology and Oceanography* will be a quarterly and Volume I will be issued in 1956. David G. Frey, Indiana University, Bloomington, will serve as Editor of the new journal. The Editorial Board is composed of the following members: W. T. Edmondson, University of Washington, K. O. Emery, Univ. of Southern California, R. H. Fleming, Univ. of Washington, H. H. Haskin, Rutgers University, A. D. Hasler, Univ. of Wisconsin, G. E. Hutchinson, Yale University, D. W. Pritchard, Chesapeake Bay Institute, D. S. Rawson, Univ. of Saskatchewan, and F. A. Richards, Woods Hole Oceanographic Institute. Subscriptions for members of the Society will be $7.50 per year and for libraries and non-members, $10.00 per year. Subscriptions and requests for membership applications should be sent to the secretary-treasurer, Bostwick H. Ketchum, Woods Hole, Mass.

• The 47th Annual Meeting of the **American Phytopathological Society** was held during the AAAS meetings at Atlanta, Ga., Dec. 27-30. Officers elected for 1956 at that meeting will be announced in the next issue of the *Bulletin*.

• **W. D. Mills,** Cornell University, was presented recently with a U.S.D.A. Superior Service Award for 32 years of outstanding extension work in New York State. Dr. Mills is a member of the American Phytopathological Society.

• **C. H. Coons,** an expert on the diseases of sugar crops, retired Nov. 30 after 30 years with the U.S.D.A.

• **H. B. Humphrey,** a Past President of the American Phytopathological Society, died October 13, at age 82.

• **DeWitt Nelson,** Director of the California Dept. of Natural Resources, has been elected President of the **Society of American Foresters** to succeed Elwood L. Demmon. George A. Garrat, Dean of the Yale University School of Forestry, was elected Vice-President.

• **The American Society of Human Genetics** will be one of the sponsoring societies of the First International Congress of Human Genetics, to be held in Copenhagen, Denmark, August 1-6, 1956. The next annual meeting of the Society will be held August, 1956, at the University of Connecticut with AIBS.

• **A Symposium, "Recent Progress in Genetics and its Implications for Psychiatric Theory"** has been arranged by the American Society of Human Genetics in collaboration with the American Psychiatric Association for the forthcoming meeting of APA to be held in Chicago, May 2, 1956. Speakers will be: H. J. Muller, "Genetic Principles in Human Populations", Linus Pauling, "The Molecular Basis of Genetics", and Franz J. Kallmann, "The Genetics of Human Behavior". Discussants will be Henry Brosin and Bentley Glass.

• **Arthur G. Steinberg,** Children's Cancer Research Foundation, Boston, has been appointed Editor of the *American Journal of Human Genetics*, effective January 1, 1956. Dr. Steinberg succeeds Laurence H. Snyder, University of Oklahoma.

• **The Mycological Society of America** will receive applications for its newly established graduate fellowship in mycology. To be awarded for the first time in 1956-57, this fellowship carries a stipend of $750 and is open to predoctoral students in residence at the institution where they are registered. Forms for application may be obtained after January 1, 1956 from the secretary-treasurer of the Society: Dr. C. J. Alexopoulos, Dept. of Botany, Michigan State University, East Lansing, Mich. Applications are due by February 15, 1956.

• **The American Society of Plant Taxonomists, through the generosity of Mr. George R. Cooley, is offering two cash awards yearly for a period of five years.** The one award carries an honorarium of $500 and the other $100. The larger award is to be given for a published paper based on original research and concerned largely with the taxonomy of plants of Southeastern U.S., including the states of Alabama, Arkansas, Georgia, Florida, Louisiana, Mississippi, North Carolina, South Carolina and Tennessee. Papers must be published in the calendar year prior to that in which the award is made. A committee of ASPT, appointed for the purpose, will select the award paper. Excellence in all phases of the paper will be the primary guide but if, in the judgment of the committee, no paper is submitted that is meritorious and of sufficiently high quality, the award may be postponed. The committee to administer the above award is composed of: Donovan S. Correll, Chairman, Harold W. Rickett, and Edgar T. Wherry. Papers should be sent to Dr. Correll for consideration.

The smaller award of $100 is to be given for an oral paper in any phase of plant taxonomy delivered before the membership of the Society at the program of its annual meeting. The committee that will judge the merits of such papers consists of: Robert T. Clausen, Chairman, John M. Fogg, and H. L. Mason. Papers presented at the next annual meeting, to be held at the University of Connecticut, Storrs, August 26-30, 1956, will be considered for the award.

The A.I.B.S. Reports

• **The AIBS Advisory Committee on Biology** to the Office of Naval Research met in Washington, D.C. on November 17-18, 1955 to consider the scientific merit of 29 research proposals. Frank A. Brown, Jr., of Northwestern University is chairman of this Committee. The next meeting of this Committee will be held April, 1956, at the time of the Federation meetings in Atlantic City.

• **The AIBS Advisory Committee on Biochemistry** to the Office of Naval Research met in Washington, D.C. on December 2, 1955, to consider the scientific merit of 6 research proposals. The Chairman of this Committee is Severo Ochoa of New York University College of Medicine. This Committee, too, will meet again in April, 1956, at Atlantic City.

• **The ONR-sponsored AIBS symposium, "Molecular Structure and Biological Specificity",** was held October 28-29, 1955 in Washington, D.C. The Symposium, under the chairmanship of Linus Pauling, created considerable interest among industrial, government and academic research scientists. The proceedings of this two-day conference will be published in book form by AIBS in early 1956.

• **The Editorial Board of the *AIBS Bulletin*** met in Washington, D.C. November 12, 1955. Dr. Ronald Bamford, Chairman, told the Board of the widened scope of activity that had been assigned to it by the Executive Committee. In the past the Editorial Board had been solely concerned with *Bulletin* content. Now it was being asked to advise on financial matters and serve as a consulting group for the publication, in book form, of a new series of AIBS symposia proceedings. Both the Board and the Editor will welcome any suggestions from the membership of AIBS for the improvement of the *Bulletin*. Only through such communications from the readers can the Editor plan *Bulletin* issues that will be of interest to everyone.

• **The AIBS Publication Committee** met in Washington on December 11, 1955. William R. Duryee concluded two years of valuable service as chairman of the Committee and will continue as a member. John A. Behnke, Associate Administrative Secretary of A.A.A.S. succeeds Dr. Duryee as Chairman.

• At the annual meeting of the **Scientific Manpower Commission,** held in Washington, November 11, 1955, **John R. Nicholas,** one of the two AIBS members of the Commission, was elected President for 1956. **Frank P. Cullinan** was reelected a member of the Commission for a three-year term to represent AIBS.

CALLING ALL BIOLOGISTS

The opportunity to participate in the growth of YOUR national biological organization —the American Institute of Biological Sciences—is now available. *Personally*, as well as through your professional society, you may contribute to the firm establishment and the future development of a cooperative, unified Institute. Five classes of individual membership are available.

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A subscription to the *AIBS Bulletin* accompanies each individual membership. If you are already receiving the *Bulletin* through membership in a Member Society, you may designate another recipient for the second copy. May we suggest a high school student, high school biology teacher, or library, or a graduate student.

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*One copy of each publication submitted for listing should be sent to the Editor, AIBS Bulletin, 2000 P Street, N.W., Washington 6, D.C. Only books published within a year of receipt will be reviewed. Books marked with an * are those published by Bulletin advertisers.*

ANIMAL SCIENCES

California Grizzly. TRACY I. STORER and LLOYD P. TEVIS, JR. 335 pgs., illus. University of California Press, Berkeley 4, Calif. (1955) $7.50

The California Grizzly is now extinct although it is commemorated in the Bear Flag, the Great Seal of California, and the names of many places in the state. When it became extinct, and until now, no account of its natural history had been written. This neglect has been remedied with a thoroughly fascinating book. Not only do the authors survey the zoological history with care, but historical and anthropological literature is woven into the story. The book should appeal to the general public as well as naturalists and those interested in the history of California. Both authors are zoologists at the University of California.

The Barren Ground Caribou of Keewatin. FRANCIS HARPER. 163 pgs., illus. University of Kansas Museum of Natural History, Lawrence, Kansas. Publ. No. 6. For sale by The Arctic Institute of North America, 1530 P Street, N.W., Washington 5, D.C. (1955) $1.50

The Barren Ground Caribou is the source of food and clothing for hundreds of Eskimo and Indian tribes, performs extensive and spectacular migrations, and is one of the few animals that can be seen in vast herds. For these reasons, if no others, it is of considerable interest to ecologists and mammalogists. The author has prepared a most comprehensive monograph, largely from first-hand information gathered since 1947 in the Keewatin region of the Arctic. The work was done under the auspices of the Arctic Institute of North America.

The Reptile World. CLIFFORD H. POPE. 325 pgs., 221 illus. Alfred A. Knopf, 501 Madison Ave., New York 22, N.Y. (1955) $7.50

The Reptile World is a very handsome book. A layman will find it thoroughly enjoyable and fascinating. A scientist will find it detailed, accurate and definitely "scientific." Such a combination is rare in current writing. Mr. Pope deals with the five major groups of reptiles: crocodiles, tuatara, turtles, snakes and lizards. In addition to a general account of physical characteristics, distribution, feeding, reproduction, and economic significance, detailed descriptions of genera and species are included for identification purposes. Practical information about snakes is included. Common names are given as well as scientific. The photographs used for illustration are arresting, and usually feature pertinent points of identification.

Finding Birds in Mexico. ERNEST P. EDWARDS. 101 pgs., illus. E. P. Edwards and Co., Amherst, Va. (1955) $1.90

The author had the highway traveler to Mexico in mind when he prepared this small volume. Such a traveler could be either a birdwatcher or a professional ornithologist. The identification of Mexican birds as well as the best birding areas and the terrain of such areas, are included. Ornithologically, Mexico is still incompletely known but the author feels that this very situation is a strong reason for assembling what is already known. The plates, pen and wash drawings, were prepared by the author and Frederick K. Hilton.

***An Introduction to Human Anatomy.** CLYDE MARSHALL and EDGAR L. LAZIER. 420 pgs., 329 illus. W. B. Saunders Co., West Washington Square, Philadelphia, Pa. (4th edition, 1955) $4.50

The fourth edition of Dr. Marshall's *Anatomy*, originally published in 1935, has been revised but not completely rewritten. The major changes are in the treatment of the neurosensory system and the endocrine glands. Some new illustrations have been added. Those who found this particular anatomy text suitable for their needs in the past will welcome this new edition.

***Integrated Principles of Zoology.** CLEVELAND P. HICKMAN. 956 pgs., illus. C. V. Mosby Co., 3207 Washington Blvd., St. Louis 3, Mo. (1955) $6.50

The author states that, "The major aim of this text is to present to students of college level the zoological background of their own bodies, their position in the animal kingdom, and an appreciation of animal life as it related to their understanding and welfare." Man is not overly emphasized however. The book is written primarily, not for the student who will become a professional zoologist, but for those who need biology as part of a broad cultural background. This does not mean that the material is lacking in detail or limited in scope. Illustrations are ample and some are unusual.

***The Invertebrates. Vol. IV. Echinodermata.** LIBBIE H. HYMAN. 763 pgs., 280 figs. McGraw-Hill Book Co., 330 West 42nd St., New York 36, N.Y. (1955) $10.00

Each new volume that appears in Dr. Hyman's monumental *The Invertebrates* guarantees for biologists the best source books possible for animals without backbones. The fourth volume, on echinodermata, offers the usual detailed account of anatomy, embryology, physiology and ecology. This is the first volume in the series to devote so much space to geographical distribution but Dr. Hyman believes it is warranted because of the conspicuous place occupied by the echinoderms in the littoral marine fauna. The illustrations are, again, the work of the author and as meticulous as her writing. Dr. Hyman concludes her preface to the book with "I also here salute the echinoderms as a noble group especially designed to puzzle the zoologist."

PLANT SCIENCES

Flora of Winnebago County, Illinois. EGBERT W. FELL. 207 pgs., illus. Nature Conservancy, 4200 22nd St., N.E., Washington 18, D.C. (1955) $2.75 (paper-bound), $3.50 (cloth-bound).

This compact offset volume is an annotated list of approximately 1000 vascular plants of northern Illinois and southern Wisconsin. 87 species are illustrated with line drawings. Several maps of the region are included in a back cover pocket. For his long standing interest in, and knowledge of, plants of this region the author has been appointed honorary curator of botany at the Illinois State Museum.

Modern Systematic Pomology. QUENTIN B. ZIELINSKI. 296 pgs., illus. Wm. C. Brown Co., Dubuque, Iowa. (1955) $5.00

The author has prepared a text to meet the needs of beginning students of systematic pomology. Part One presents the theories, hypotheses and principles of modern systematics. Part Two covers 12 genera of fruit plants widely known in North America and 31 genera of subtropical and tropical species. Semi-technical descriptions of each are presented, the geographic and ecological distribution of family representatives included, and comprehensive bibliographies added. The book is a spiral, paper-bound edition.

MISCELLANEOUS

***International Review of Cytology. Vol. IV.** Edited by G. H. BOURNE and J. F. DANIELLI. 419 pgs. Academic Press Inc., 125 East 23rd St., New York 10, N.Y. (1955) $9.00

The fourth volume in this able series of reviews in cytology contains a dozen papers. N. J. Kopac reviews technical developments in micromanipulation; M. Wolman writes on principles and problems of fixation; L. E. Wagge discusses the functions of amebocytes; A. Marshak, the main elements of bacterial cytology and R. Vendrely, the cytochemistry of bacteria; D. P.

Hackett contributes a review of plant mitochondria; K. Mühlethaler, an article on chloroplasts; N. B. Kurnick, a critical review of cytochemical techniques for the study of nucleic acids; W. S. Vincent, a comprehensive review of nucleoli; H. Moe, a survey of goblet cells; R. Couteaux discusses cholinesterases at neuromuscular junctions; and E. J. Conway contributes part two of a discussion on redox pump mechanisms for ionic transport.

Group Processes. Edited by BERTRAM SCHAFFNER. 334 pgs. Josiah Macy, Jr. Foundation Publications, P.O. Box 575, Packanack Lake, N.J. (1955) $5.50

The Josiah Macy Jr. Foundation serves science well in conducting conferences that bring together scientists from many different professions. *Group Processes* contains the transactions of such a Conference, held at Ithaca, N.Y. in September 1954. Topics and leaders were: Ontogeny and Living Systems, Frank A. Beach; Psychology and Ethology as Supplementary Parts of a Science of Behavior, Niko Tinbergen; Morphology of Behavior Patterns in Closely Allied Species, Konrad Z. Lorenz; Dynamics of the Mother-Newborn Relationship in Goats, Helen Blauvelt; The Nature of Perception, Daniel S. Lehrman; and Group Processes in the Lower Vertebrates, L. T. Evans. The transactions include discussions, charts and illustrations, and bibliographies.

Bibliography of Monolingual Scientific and Technical Glossaries. Vol. I. National Standards. 219 pgs. Columbia University Press, 2960 Broadway, New York 27, N.Y. (1955) $2.50

The introduction to this small book states, "The term 'monolingual technical glossary' is taken here to include any publication which lists the stock of terms appertaining to any given field of knowledge in any one language, whether with or without explanations other than translations, and whatever the size and completeness of the work, regardless of whether the terms are arranged systematically or alphabetically, and of whether their meanings are explained by way of a definition, illustration, formula, or simply by the manner of grouping them." This is the first such bibliography to be published.

Administrative Medicine. Edited by GEORGE S. STEVENSON. 172 pgs. Josiah Macy Jr. Foundation Publications, P.O. Box 575, Packanack Lake, N.J. (1955) $3.00

Administrative Medicine contains the transactions of the third conference on the subject, held at Princeton, N.J., October 1954. Speakers and their subjects are as follows: Edward S. Rogers, Special Characteristics of Medical Administration Problems Which Make Them Different from Other Fields of Administration; Anthony J. J. Rourke, Medical Administration—Distinctive Characteristics and Educational Requirements; Ray E. Trussell, The Hospital and Its Relationship to the Community; W. W. Tudor, Principles and Concepts of Business Administration as Applied to Medical Administration; Herbert Emmerich, Administration as a Tool and Technical Knowledge as a Guide; Bradley Buell, Administrative Problems of the Community as a Whole. As is customary, discussions are included *in toto* and bibliographies appended.

***Vitamins and Hormones. Advances in Research and Applications. Vol. XIII.** Edited by R. S. HARRIS, G. F. MARRIAN and K. V. THIMANN. 383 pgs. Academic Press Inc., 125 East 23rd St., New York 10, N.Y. (1955) $9.00

The thirteenth volume in the Academic Press review series on *Vitamins and Hormones* contains nine chapters written by the following authors: A. E. Axelrod and J. Pruzansky, The Role of the Vitamins in Antibody Production; H. J. Deuel, Jr. and Raymond Reiser, The Physiology and Biochemistry of the Essential Fatty Acids; L. W. Mapson, The Biosynthesis of Ascorbic Acid; J. E. Ford and S. H. Hutner, Role of Vitamin B_{12} in the Metabolism of Microorganisms; C. C. Ungley, The Chemotherapeutic Action of Vitamin B_{12}; L. B. Pett, Vitamin Requirements of Human Beings; Dean A. Smith, Parasitic Infections and Nutrition; W. S. Bullough, Hormones and Mitotic Activity; and Oscar Hechter, Concerning Possible Mechanisms of Hormone Action. Each review brings research developments current to the spring of 1955.

***Advances in Agronomy. Vol. VII.** Edited by A. G. NORMAN. 431 pgs., illus. Academic Press Inc., 125 East 23rd St., New York 10, N.Y. (1955) $8.80

Eighteen scientists have contributed to the 7th volume of this excellent review series. Subjects discussed include Soil Aggregation, Recent Changes in Swedish Crop Production, Mineral Nutrition of Plants as Related to Microbial Activities in Soils, Improvement of the Sugar Beet in the United States, Green Manuring Viewed by a Pedologist, Plant Introduction as a Federal Service to Agriculture, The Enigma of Soil Nitrogen Balance Sheets, Weed Control in Principal Crops of the Southern United States, Mineralization of Organic Nitrogen in Soil, and the Place of Microbiology in Soil Science.

American Men of Science. Vol. II. Biological Sciences. Edited by JACQUES CATTELL. 2180 pgs. R. R. Bowker Company, 62 West 45th St., New York 36, N.Y. (1955) $20.00

The length of the revision of *American Men of Science* reached such proportions that three volumes instead of the familiar one were found to be necessary. Volume II contains biographical facts about 25,000 American and Canadian biologists. 50 biological fields are included and each biography, as before, supplies a scientist's full name, position, education, professional background, specialty, membership in professional societies, date of birth, marital status, and number of children. Vol. I, the Physical Sciences appeared earlier in 1955, and Vol. III, the Social Sciences, is expected in the summer of 1956.

Small-Angle Scattering of X-Rays. ANDRE GUINIER and GERARD FOURNET, translated by CHRISTOPHER B. WALKER, with a bibliography by KENNETH L. YUDOWITCH. 268 pgs., 87 figs. John Wiley & Sons, 440 Fourth Ave., New York 16, N.Y. (1955) $7.50

The subject of this translation from the French is a field that has been opened only rather recently. The first observations were made in 1930 but attention did not turn to small-angle scattering of x-rays until the late '30s. Now an ever increasing number of scientists are interested in it. The authors felt that it was time for a monograph on the subject—one that would include theory, evaluation of experimental results, and apparatus and application. The senior author is Professor at the Université de Paris and the junior author is a Lecturer at the École Supérieure de Physique et Chimie, Paris.

***Physical Techniques in Biological Research. Vol. I.** Edited by GERALD OSTER and ARTHUR W. POLLISTER. 564 pgs., illus. Academic Press Inc., 125 East 23rd St., New York 10, N.Y. (1955) $13.50

Three volumes have been planned under this ambitious title: Vol. I, Optical Techniques; Vol. II, Physical Chemical Techniques, and Vol. III, Cells and Tissues. The application of physical techniques to biology has increased greatly in recent years and will doubtless continue to or even accelerate. It is hoped that the material in these volumes, written by individual experts, will assist biologists in employing new techniques, or indicate whether particular problems need collaboration with a physicist or physical chemist. It is also hoped that the physicist will see new applications for his training and perhaps be challenged to undertake some of the baffling problems of biology. The advisory board for the three volumes is composed of: J. Brachet, M. Calvin, E. DeRobertis, A. Frey-Wyssling, P. Grabar, A. Hollaender, D. Mazia, J. T. Randall, and A. Tiselius.

Conservation Handbook. Edited by RICHARD L. WEAVER. 499 pgs., illus. National Association of Biology Teachers, National Conservation Committee, P.O. Box 2073, Ann Arbor, Mich. (1955) $4.00

Conservation Handbook was prepared by two hundred teachers from thirty states who offered information on how they incorporated conservation and resource-use teaching into their schools. The "How To Do It Stories" and pictures should help other teachers and youth leaders to initiate and carry out similar projects in their areas. The book was prepared under a project

grant from the American Nature Association. Proceeds from its sale will be used to continue the conservation education activities of the NABT Committee.

Medical Support of the Army Air Forces in World War II. 1027 pgs., illus. Office of the Surgeon General, USAF. Obtainable from Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. (1955) $7.00

Shortly after the close of World War II medical historians in the Air Force and Army Air Force undertook to compile the immense quantity of material about medical support during the war. This outsize volume is the published result. Both civilian and military medical personnel should find the wealth of historical, medical, physiological and military information valuable. An apt quotation, that could be called the reason for the book, is one by Gen. Henry H. Arnold that appears in the foreword. "The problems we have overcome in this war will not differ from possible problems of the future. The solutions will come from the things we have learned of this war. There will be nothing new facing us that has not already been answered in principle if not in practice."

International Pharmacopoeia. Vol. II. 350 pgs. World Health Organization, Geneva, Switzerland. (1955) $6.75

The task of gathering information for this book was begun in 1937 under the auspices of the League of Nations Health Organization and has been carried on since 1947 by the World Health Organization. 417 pharmaceutical compounds or substances are covered in this second volume, 26 appendices offer methods of assay, tables of dosages, children's doses and include a list of the International Biological Standards and Reference Preparations. A detailed index to Vol. I and II appears at the end of Vol. II.

Soviet Professional Manpower. Its Education, Training and Supply. NICHOLAS DE WITT. 400 pgs. National Science Foundation, Washington, D.C. Obtainable from Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. (1955) $1.25

The publication of this book has created a well-justified buzz of discussion. At a time when the scientific manpower situation in the United States is considered critical, facts and figures about the Soviet Union are timely and important—particularly so when these figures reveal that our output of trained personnel is considerably behind that of the USSR. The book should serve to focus attention, at a local level, on the increased need for identifying and training persons with special aptitudes for careers in science and technology. Some comparative figures will be found in a note in the "Biological Education" column.

***Fibrous Proteins and their Biological Significance.** No. IX. Symposia of the Society for Experimental Biology. 370 pgs., illus. Academic Press Inc., 125 East 23rd St., New York 10, N.Y. (1955) $8.00

Ninth in an annual series, this volume contains the papers read at a Symposium of the Society for Experimental Biology held at Leeds, England, September 1954. The so-called fibrous proteins, which mainly serve covering, framework and mechanical purposes, were made the subject of an entire symposium because of "intensified research activity and mounting excitement about them everywhere." Twenty-one papers, ranging from the extremes of muscular activity to bacterial flagella, through "straight" chemical analysis, molecular configurations, classification, and experimental techniques, are included.

International Encyclopedia of Unified Science. Vol. I. Part 1. Edited by OTTO NEURATH, RUDOLF CARNAP and CHARLES MORRIS. 339 pgs. University of Chicago Press, 5750 Ellis Ave., Chicago 37, Ill. (1955) $6.00

Thoughtful scientists in every field will be interested in this *Encyclopedia.* Universal, increased interest in the possible, even necessary, unity of science led to the preparation of monographs for these two volumes. In Part 1 Otto Neurath introduces the series with "Unified Science as Encyclopedic Integration"; John Dewey discusses "Unity of Science as a Social Problem"; Rudolf Carnap analyzes the "Logical Foundations of the Unity of Science"; and Charles W. Morris attempts to formulate a general framework in "Scientific Empericism." In two shorter papers, Niels Bohr writes about "Analysis and Synthesis in Science" and Bertrand Russell, "On the Importance of Logical Forms."

International Encyclopedia of Unified Science. Vol. I. Part 2. Edited by OTTO NEURATH, RUDOLF CARNAP and CHARLES MORRIS. 760 pgs. University of Chicago Press, 5750 Ellis Ave., Chicago 37, Ill. (1955) $6.00 (Set of two volumes, Part 1 and 2, $11.00)

In Part 2 of the *Encyclopedia,* Ernest Nagel begins with "Principles of the Theory of Probability"; Philipp Frank explores the logical structure of physical theories in "Foundations of Physics"; E. Finlay-Freundlich discusses "Cosmology" in terms of present-day astronomy; Felix Mainx examines the "Foundations of Biology"; and Egon Brunswik presents "The Conceptual Framework of Psychology."

Biological Education

• **The Ford Foundation's recent "transfusion" to education is of staggering proportions.** Grants totaling $500 million have been announced. $210 million will go to 615 regionally accredited, privately-endowed, liberal arts colleges and universities. Another $200 million will be received by some 3500 private, non-profit hospitals. $90 million will find its way to medical schools. An interesting, and important, condition of the grants made to colleges and universities is that the money must be spent on faculty salaries only. Arrangements are to be made by each college to invest the money as they see fit and use the returns for the first ten years in this way. The amount to be received by each institution is based on its 1954-55 payroll. New York University will receive a ceiling amount of $5 million but 35 other colleges and universities will be the recipients of over $1 million each.

• An encouraging indication of the widespread interest in education problems and the realization of the need for cooperation were shown by **a meeting of representatives of more than a dozen professional scientific organizations** in Washington, D.C., October 6-7, 1955. The Conference was called by the American Association for the Advancement of Science and the National Science Foundation and representatives of the following organizations were in attendance: American Chemical Society; ACS, Division of Chemical Education; ACS, Committee on Institutes and Conferences; National Science Teachers Association; National Research Council; Division of Physical Sciences; NRC, Division of Biology and Agriculture; American Institute of Physics; Federation of American Societies for Experimental Biology; National Council of Teachers of Mathematics; National Association of Biology Teachers; Central Association of Science and Mathematics Teachers; Mathematical Association of America; American Institute of Biological Sciences; National Committee for Research in Science Teaching; and U.S. Office of Education. The twenty-six participants exchanged information on their individual activities and explored the possibilities of cooperative effort. The reports given by each group revealed that every branch of science was making some effort through their societies or national organizations to assist in improving science teaching and alleviating the present teacher shortage. Projects and plans of many of the participating organizations will be covered at a later date in this column.

• **Hunter College and the Sloan-Kettering Institute have announced a new graduate program for the training of laboratory associates in the biological sciences.** This program, to be initiated February 1956, is designed to assist in alleviating the acute shortage of qualified personnel available for research laboratory work. The program will be offered by the science faculties at Hunter College with the cooperation of some of the faculty of the Sloan-Kettering Division of Cornell University Medical College at the Sloan-Kettering Institute. A grant from the Alfred P. Sloan Foundation has made it possible to undertake the venture. The program is open to qualified college graduates who have majored in the sciences. There will also be an opportunity for practical internship. Two graduate assistantships paying $750 each are available to students who are prepared to study full time. Course fees are $10 per credit. Further information may be obtained from the *Office of Admissions, Hunter College, 695 Park Ave., New York 21, N.Y.*

• A recent study by the American Psychological Association of its membership over 60 years of age, showed the need for wise consideration of the problems connected with advancing age and retirement. The Scientific Manpower Commission too, believes that **the attention of every professional society should be focused on the problem of the overage scientist.** A substantial number of older scientists, who are retired or unemployed are seeking re-employment and generally encountering difficulties. At a time when manpower is in such short supply, too little attention is being paid to this available pool. The numbers involved are not large but they are more or less in constant proportion to the total membership of each professional group. A general organization is not as well qualified to assist these people as the specialized professional societies. Present retirement policies are in many cases forcing able and still tremendously capable persons to abandon their productive roles as scientists or teachers. Perhaps the adoption of more flexible retirement policies by educational institutions would do much to cut down this yearly loss.

Professor Emeritus Constantine Panunzio, of the University of California, is presently studying the status of retired professors in all fields of learning. He estimates that there are approximately 10,000 persons in this category. Canvassing 20% of these, Dr. Panunzio found that they are living on an average retirement pay of $184 a month. A substantial fraction of them are able and willing to return to teaching or to other professional work. With the increased student enrollment that looms ahead for universities and colleges and the steadily decreasing numbers of graduating scientists who intend to teach, these retired individuals may become an important asset. Let's not waste such experienced manpower.

• **A recent report (the 8th annual) from Great Britain's Advisory Council on Scientific Policy, shows that the United Kingdom is suffering from an acute shortage of scientists and engineers just as we are in this country.** Also, as we are, they are faced with a dearth of science teachers. As in the U.S.A., the science teacher problem has two facets, quality and quantity shortages. The British Ministry of Education has asked, as a measure to meet the problem, that Government Departments and industry attempt to reduce the numbers of science graduates they hire annually until the desperate need for teachers can be met.

• **The recently published results of a study by the Office of Scientific Personnel of the National Research Council show that a dozen or so large universities train the bulk of our nation's scientists,** 5,748 of the 11,407 students who were granted doctorate degrees in the period 1946-50. The University of Wisconsin ranked first in the nation with 689 students who had completed their *doctorate degrees in science fields.* Following Wisconsin were Cornell, 559, M.I.T., 552, California (Berkeley), 543, Illinois, 517, Ohio State, 516, Harvard, 445, Minnesota, 427, Chicago, 410, Columbia, 384, Purdue, 364, and Michigan, 342. The first twenty schools at which these *doctorate graduates studied as undergraduates* were as follows: California (Berkeley), City College of New York, Illinois, Chicago, Harvard, Minnesota, Wisconsin, M.I.T., Michigan, Ohio State, Brooklyn College, Cornell, Penn State, California (Los Angeles), New York, Purdue, Columbia, Yale, Iowa State, Washington, California Institute of Technology.

The top ten schools granting baccalaureate degrees for *biology doctorates* during 1946-50 were: California (Berkeley), 104, Cornell, 59, Illinois, 58, Minnesota, 55, Chicago, 47, Wisconsin, 40, Iowa State College, 37, Ohio State, 33, University of Michigan, 31, and City College of New York, 30.

In the field of *botany*, the following schools led: Cornell, 66, Wisconsin, 62, California (Berkeley), 49, Iowa State College, 43, Minnesota, 29, Harvard, 25, Chicago, 23, Ohio State, 22. In *zoology* the placement was: University of Michigan, 47, Cornell, 38, Wisconsin, 35, California (Berkeley), 33, Chicago, 27, Harvard, 26, Ohio State and Stanford, each 24, Columbia and Illinois, each 22. *Agriculture* showed the following: Cornell, 124, Wisconsin, 85, Iowa State College, 57, Minnesota, 35, Ohio State, 34, and Illinois, 31. Two smaller biological fields, entomology and genetics, that were considered separately, showed the first four schools to be as follows: *Entomology:* California (Berkeley), Cornell, Ohio State, and Illinois; *Genetics:* Minnesota, Wisconsin, Iowa State College, and California (Berkeley).

The publication from which these figures were taken, "Baccalaureate Origins of Science Doctorates Awarded in the United States, 1936-50" is publication No. 382 of the National Research Council, and is priced at $2.00.

• **Figures have just come to hand of the numbers of graduates in biology and agriculture for the academic years 1953-54 and 1954-55.**

B.A. or B.S.	*1953-54*	*1954-55*
Biology	9366	9050
Agriculture	7832	7170
M.S.		
Biology	1610	1609
Agriculture	1302	1364
PH.D.		
Biology	1077	991
Agriculture	515	507

During this same two-year period, graduates in physics and chemistry showed an increase of 6%. In the same span, engineering showed a 1% gain.

• **A pilot study that should be of interest to many communities is under way in Arlington, Virginia.** In this city the School Board, PTA and civic groups are cooperating to raise a scholarship fund that will enable teachers to take graduate level courses and to familiarize themselves with both fundamentals and recent developments in science and mathematics. Local universities including George Washington University, University of Maryland, University of Virginia, American University, Georgetown University, Catholic University, Howard University and the District of Columbia Teachers' College are cooperating to develop and offer new courses in mathematics, physics, chemistry and biology during the summer of 1956. This program to arrange supplementary training was initiated by the National Research Council with the cooperation of the AAAS and the encouragement of business and industrial groups.

Another facet of the plan will provide qualified teachers with opportunities for summer employment in local scientific and engineering organizations in both industry and government. Previous ventures in this area in other parts of the country have been quite successful (many organized through the efforts of the National Science Teachers Association). Any encouragement that can be given in this direction will result in better-trained science teachers in more communities.

Anyone desiring further information about the ways and means of the Arlington plan should write: *Dr. John S. Coleman, Executive Secretary, Division of Physical Sciences, National Research Council, 2101 Constitution Avenue, Washington, D.C.*

• ***Scientific Personnel Resources,*** a summary of data on the supply, utilization and training of scientists and engineers, was published recently by the National Science Foundation. (Obtainable for 50 cents from the Superintendent of Documents, Washington 25, D.C.) The report states that there were approximately 200,000 scientists and 650,000 engineers in the U.S. in 1954. Breakdown figures for field, age and levels of education are given. One interesting section is that on the education of scientists which shows that at a time when the high school population is increasing rapidly, the number of college graduates completing standard requirements to teach high school science and mathematics has decreased from a high of 9,000 to an estimated 4,000 in science and from a high of 4,000 to an estimated 2,300 in mathematics between the years 1950 and 1954.

• **The Fourth Convention of the National Science Teachers Association will be held at the Shoreham Hotel, Washington, D.C., March 14-17, 1956.** The convention theme is "Problem Solving—How we Learn" and sessions are being planned for teachers of elementary schools, junior and senior high schools, and colleges. Special features of the convention will include the annual Exposition of Science Teaching Aids and "interview visits" to several research centers around Washington, including the National Bureau of Standards, and the National Institutes of Health. Further information may be obtained by writing to *Robert H. Carleton, Executive Secretary, NSTA, 1201 Sixteenth St., N.W., Washington 6, D.C.*

• **The Future Scientists of America Foundation** (of the National Science Teachers Association) **is planning to conduct the Third Annual West Coast Summer Conference,** with the cooperation of Oregon State College and the Crown Zellerbach Foundation. The Conference will be held June 17-30, 1956 at Oregon State College. Participants will be selected as follows: eight teachers from each of the states of Washington, Oregon, and California and eight from the states of Idaho, Utah, Nevada and Arizona combined. Applications will be received from teachers, supervisors, coordinators and directors of science in grades 7 through 12 in any of the schools of the above states. The 32 applicants chosen will each receive a Fellowship of $200 to defray travel and maintenance cost during the Conference. *Applications must be postmarked not later than April 10.* Selections will be made by May 1. Application forms may be obtained by writing to: *Future Scientists of America Foundation, 1201 Sixteenth St., N.W., Washington 6, D.C.*

The Conferees will gather data by visiting research laboratories and interviewing biologists, chemists, physicists, geologists, engineers, and other scientists. These visits will allow the participating teachers to learn how successful scientists identify projects, plan research, carry out the work and prepare reports. Study groups will then extract from these interviews implications appropriate for the secondary school level.

• **The Civilian Personnel Officer, Thomas Pickett, at White Sands Proving Ground, Las Cruces, N. Mex., has come up with some practical solutions to his manpower problems that might have application elsewhere.** The problems facing Mr. Pickett were: (1) a present and anticipated shortage of scientists and engineers to carry on the work at the Proving Ground, (2) a current need for keen subprofessional personnel to serve as research aides. In cooperation with the state educational authorities, able high school students were identified. In cooperation with a number of universities, courses particularly suitable to the needs of the Proving Ground were made available, so students could work six months at the Proving Grounds and attend university the alternate six months. This cooperate effort with state authorities has given educational opportunity to talented young people who would otherwise be lost to the scientific professions while, at the same time, and at no cost to the installation, the Proving Ground is getting excellent personnel, not otherwise obtainable.

• **Local Boards of the Selective Service Operations were asked** (Bulletin No. 126, June 6, 1955) **to consider the following recommendations regarding science teachers:**

"Among the list of critical shortages are teachers of science and mathematics and the secondary schools are particularly hard pressed to find qualified teachers on these subjects. Local boards should give careful consideration to an occupational deferment for any registrant who is qualified and who may be accepted as a teacher of science or mathematics."

• **One method of tackling the shortage of available scientists for industry in Great Britain has been the establishment of a fund of more than $4 million to stimulate science education in secondary schools.** Seventeen large industrial firms contributed the sum which is to be used as capital grants for the building, expansion, modernization and equipment of science buildings in independent schools and those that lack private funds. The fund is also to be used for the improvement of the teaching of pure and applied science and mathematics in these schools. Among the firms contributing are Rolls Royce, Shell Oil, English Electric and Courtaulds.

• **Washington University, St. Louis, is setting an example that could be followed by many other universities and colleges.** In cooperation with the St. Louis Public Schools Advisory Committee, the University has designed a series of lectures for high school science teachers on the most recent developments in science. Entitled "Frontiers of Science", the series, so far, has drawn two-thirds of the science teachers of the region. It is hoped that the lectures will both stimulate these teachers and encourage them to create a greater interest in science among their pupils. The lectures are open to all teachers in public, private and parochial schools in the St. Louis area. The St. Louis Public School System has cooperated by allowing the teachers time off to attend. The program was arranged by the following faculty committee at Washington University: Barry Commoner (chairman), Viktor Hamburger, Herbert A. Potratz, Robert D. Sard, H. LeRoy Scharon, and Sidney F. Velick.

• **The New York State Education Department announced** at a December 11th conference of the New York State Association of Secondary School Principals, **a new five-point program to help gifted pupils.** The program will emphasize and stress additional and improved science in the curricula. Three sections of the program deserve quotation. "The syllabuses in high school physics, science and biology are being revised. Deadwood will be eliminated and the courses made more challenging to the superior students. The science courses will be modernized and brought up to date." "Conferences are planned with leading industrialists in the state to work out a cooperative arrangement whereby the business concerns can lend their scientists and physicists to the schools. It is hoped to get top men in science to make visits to classrooms for periods up to six months or a year. Through this means the educators hope to encourage more youngsters to take science in high school, and then, perhaps, continue with this course of studies in college." "The State Education Department, through special guidance, and counselling services, will encourage students to take more of the so-called hard courses, such as physics, chemistry, mathematics, and science. It is also hoped to encourage more gifted students to go to college. The department has prepared a manual on 'how to study' that will be available in February for students throughout the State. The department will also seek from the Legislature when it meets next month aid to encourage superior students to continue with their education on the collegiate level."

• ***Soviet Professional Manpower,*** by Nicholas DeWitt, should receive the attention of all scientists. (see "Biology Library" column) The study shows that the Soviet Union is graduating almost twice as many technical specialists in certain fields as the United States. The entire educational policy of the Soviet has been shaped to meet the growing needs for scientific and

technical manpower. This production of trained specialists results in a very small number of graduates in the humanities, whereas in the United States between 65 and 70 percent of all graduates are in the social sciences and the liberal arts. In the U.S.S.R. specialization begins early—in the secondary schools 40 percent of all instruction is devoted to science. Strong incentive awards and preferential treatment of professionals with respect to military duty, monetary awards, social prestige and living accommodations assist in the motivation of Soviet youth toward careers in science and engineering.

Of the 2 million professionals in the Soviet Union in 1954, about *42 percent were trained for, and employed in, the field of education;* 27 percent were in engineering and related fields or employed in industry, manufacturing, mining, transportation and communication; 16 percent in health fields; 9 percent in agricultural fields, and only 6 percent in all socio-economic service fields. Dr. DeWitt stresses the fact that literal comparisons of the educational systems of the United States and the U.S.S.R. cannot be made because of fundamental differences both in the systems themselves and in the underlying philosophies. Despite such differences, comparisons reveal many important facts for our consideration.

• **Two educational notes with an international flavor appeared in a recent issue of *UNESCO Newsletter*.** The Executive Board of UNESCO, meeting recently to plan **"major projects"** for 1957-58, considered four projects proposed by the Director-General: training of normal school staff and educational administrators and specialists in Latin America; scientific research on arid lands; mutual appreciation of Eastern and Western Cultural values; and reading materials for new literates.

The same *Newsletter* announced that ten Nicaraguan graduates from UNESCO's fundamental education center at Patzcuaro, Mexico, will staff a fundamental education center planned by the government of Nicaragua. Located in the valley of the Coco River, the Center will train leaders and teachers by practical work among the Indians of 42 rural communities. The Indian villages include Cabo Gracias a Dios and Cabo Viejo, where Columbus landed on his fourth voyage of discovery.

• **Here's an opportunity to be of assistance to education in a most practical fashion.** The following letter was sent recently to the officers of the National Association of Biology Teachers. A copy was forwarded to AIBS in case suitable material was available in this office. However, most of the books that are received for review in the "Biology Library" column of the *Bulletin* are too advanced. In hopes that this emergency situation may receive the cooperation of as many *Bulletin* readers as possible, the original letter is being printed.

Gentlemen:

It was a very tragic misfortune for our little rural community when our school burned three years ago. It was a complete loss, because everything burned. There was only one-third enough insurance to rebuild. The county made arrangements for funds and we now have a new building, but no equipment. Funds for all equipment have to be raised locally.

One of our chief desires is to have a library that will adequately serve our students. We have grades one through twelve with an enrollment of 725 students. It is very difficult even in prosperous years to collect money from our patrons, but for the past three years we have had crop failures which added to our distress. We have tried very hard, but still have less than a book per pupil. We are very anxious that our boys and girls have opportunities comparable to those of other schools. If you can donate anything in the way of books or equipment, we shall be very happy.

Yours truly,

(Mrs.) Esther Reece Woods, *Librarian*
Harold E. Clark, *Principal*
(Mrs.) Wynell Federer, *PTA President*

KNOW YOUR ASSOCIATES

The American Tobacco Company Research Laboratory

Richmond, Virginia

In the year 1911, science began to catch up with the art of manufacturing tobacco products. It was in that year that The American Tobacco Company established the first industrial tobacco research laboratory. Today, this laboratory is the vital center for improving and controlling the quality of the Company's products. It is also the scene of intensive and continuous research into the chemical and physical complexities of tobacco and tobacco smoke.

The laboratory's search for quality of product begins with a pre-market survey of tobacco crops and continues to the final testing of finished cigarettes obtained, as the customer obtains them, from the retail store. To control the quality of the tobacco going into the cigarette blends, an elaborate system of sampling and testing has been devised. The tobacco is analyzed for the various constituents which have been determined by our research to be related to its quality. These tests are applied to samples of all tobacco purchased by the Company as well as to the blends in various stages of manufacture, including the finished product. The practice of analyzing tobacco samples prior to the auction—the pre-market survey—was first employed by The American Tobacco Company.

But chemical analysis of tobacco is not the whole story of the laboratory's control program. It also checks constantly all moisture testing and many other devices used in the manufacturing operations. It tests samples of all ingredients of the cigarette, such as flavoring and casing materials, and all packaging materials down to the inks with which they are printed and the adhesives which seal the various wrappings designed to preserve the original freshness of the cigarette. A separate division of the laboratory is devoted exclusively to testing cigarette paper. For the final series of tests, the finished product is put through its paces. The cigarette is weighed, drawn through, dissected, sifted, and subjected to every imaginable strain and indignity—all calculated to reveal its true smoking qualities.

Behind the control work of the laboratory is its fundamental research. Much still remains to be learned of the chemical make-up of the leaf and of its relation to quality. As an example, the tobacco aging process is constantly being studied. In spite of the outstanding improvements in taste and aroma brought about by aging, the actual chemical changes which take place in the leaf, as measured by present methods, are rather small. The principal changes are largely oxidative and hydrolytic and are thought to be due to chemical, bacteriological and enzymatic action. The precise function and importance of these processes, however, remain thus far unelucidated. Another phase of research pertains to the production of tobacco. The laboratory has an extensive quality improvement program in collaboration with state and federal agricultural experiment stations. Principal emphasis is on improvement of seed to meet disease situations which have arisen. Studies on improved strains of non-resistant varieties and cultural practices such as soil fumigation, irrigation, sucker control and curing are also constantly being pursued. The American Tobacco Company was the first in the industry to enter this field of collaborative research.

The Research Laboratory has pioneered in the study of tobacco smoke and in the development of experimental smoking techniques. Intensive research on tobacco smoke has been in progress for over twenty-five years. The general objectives are the qualitative and quantitative determination of compounds in the smoke and the study of the relation of these compounds to the composition of the tobacco. The smoking machine and

technique developed in this laboratory some 17 years ago have been adopted by most serious researchers in the field. New facilities for radiological studies, as well as mass spectrometry, represent the laboratory's continuing emphasis on the latest scientific methods in smoke research.

The research activities of The American Tobacco Company's scientific personnel have been largely directed toward purely chemical and physical studies on tobacco and its smoke. However, evaluation of the significance to man of the results of such studies, in many cases, depends upon the fund of available biologic knowledge. Such knowledge was not always found adequate to answer specific questions. For this reason, and to contribute more pertinent information in this field, The American Tobacco Company, many years ago, instituted a continuing program of collaborative biologic research at leading medical schools, the results of which would be made generally available. The following subjects are indicative of the type of studies conducted under this program: Cigarette Smoke Irritation, Fate of Nicotine in the Body, Effect of Cigarette Smoking on the Visual Process, etc. As part of this program, the Company is now financing, through a grant to the Medical College of Virginia, the construction of a special greenhouse for growing radioactive tobacco. Tobacco uniformly labeled with Carbon 14 will be obtained by growing tobacco plants in an atmosphere containing the radioactive isotope as carbon dioxide. The whole plants or individual compounds will then be available for the biologic research sponsored by the Company at the Medical College of Virginia and also for the chemical and physical studies of tobacco and smoke at its own laboratory. The greenhouse will be one of the few in the country with facilities for growing radioactive plants.

The laboratory moved into its own building in 1939. A special point of interest in this building is its handsome library, which now contains approximately 2,500 books and about 16,000 articles. It is undoubtedly the most complete collection of technical and scientific literature on tobacco in the world.

To provide space for expanding activities, a new wing, approximately doubling laboratory space, has just been completed and the present structure now accommodates about 100 employees, more than 60 of whom are technically trained.

KNOW YOUR AFFILIATES

Biological Photographic Association

The Biological Photographic Association was founded at Yale University in September 1931 by twenty-eight enthusiastic biological photographers who felt a growing need for an association. The response to the formation of the society was heartening—within months the small group had grown sufficiently large to make possible the publication of a quarterly journal. The first number appeared September 1932.

As the Association grew chapters were formed in principal cities and areas to provide a continuing program for the membership. Active chapters now exist in New York, Chicago, Boston, Philadelphia, Rochester, N.Y., Northern Ohio (Cleveland), Southern California (Los Angeles), Texas (Houston), Upper Midwest (Rochester, Minn.), and West Virginia (Philippi). Annual meetings are held in major cities of the Middle West and East, and each year the attendance of the previous year has been broken. The 1956 Annual Meeting will be held in Rochester, N.Y.

As stated in the Constitution, "the purpose of this Association should be to further the study and application of photography in relation to the biological sciences, and to improve its technique." The membership today is in excess of 1000 and consists of photographers, scientists, medical doctors, dentists, editors, students, and educators. Any individual who is interested in biological photography is eligible for Active Membership. Active Members desiring to contribute additional support to the Association by voluntarily paying any amount in excess of the annual dues may qualify as Contributing Members. Manufacturers and other institutions may become Sustaining Members by payment of an appropriate amount for support of the Association program. Annual dues for Active Members are $5.00 per year ($5.50 foreign).

Members automatically receive the quarterly *Journal* and can obtain factual information on methods, techniques and equipment from qualified authorities in the field of biological photography by directing inquiries to the National Secretary. Members also have the privilege of attending the Annual Meetings to present papers and to discuss other papers on the program. Members of five years standing who meet the qualification of a duly appointed committee can be awarded the Fellowship with the right to use the letters F.B.P.A. after their names.

At each annual meeting a competitive and open salon is shown consisting of the work of the members. The best prints in the annual salon are reserved each year for a Traveling Salon. This special selection of prints is shown widely at meetings of medical and biological groups.

Officers of B.P.A. for 1955-56 are: President: H. Lou Gibson, Rochester, N.Y.; Vice-President: Leo C. Massapust, Sr., Milwaukee; Treasurer: Albert Levin, Pittsburgh; Secretary: Jane H. Waters, New York.

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ROBERT W. PENNAK, *University of Colorado.* A comprehensive manual for biologists, zoologists, and advanced college students, drawing on more than 5,000 sources. Throughout, the author emphasizes the natural history, ecology, and taxonomy of free-living, fresh-water invertebrates of this country. Includes keys to all taxonomic groups. *482 ills., tables; 769 pp.* **$14**

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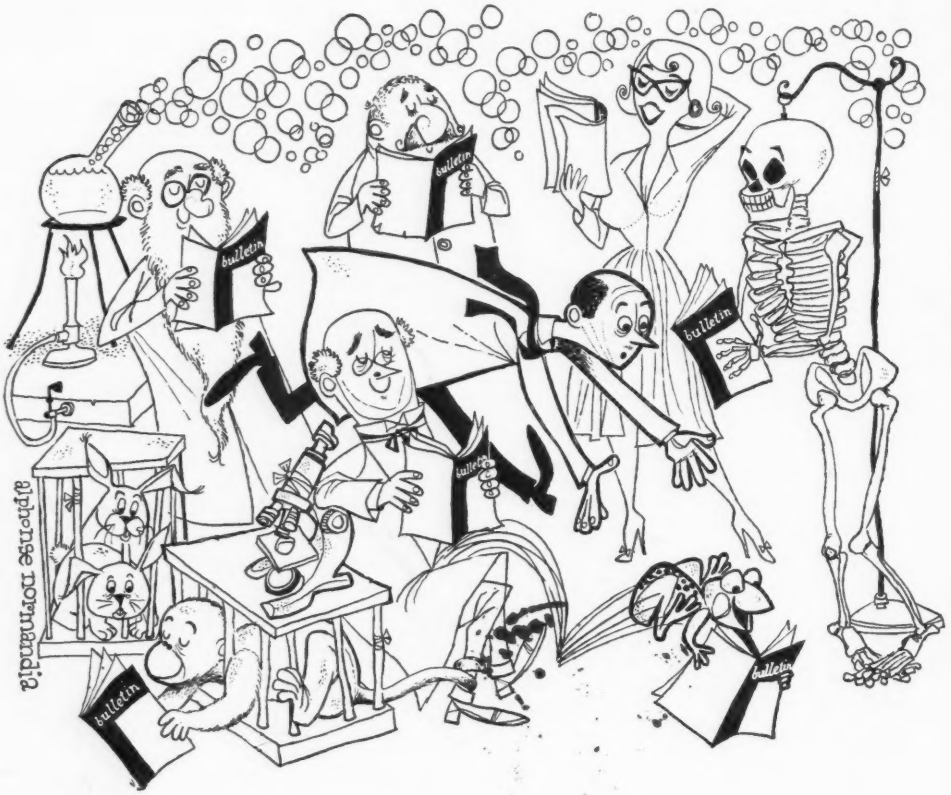

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